THE TRANSPORTATION TOMORROW SURVEY

DESIGN AND CONDUCT OF THE SURVEY

FIRST REPORT OF A SERIES

Ontario

A survey conducted for:
the Regions of Durham, Halton, Hamilton-Wentworth, Peel and York;
Metropolitan Toronto, Ministry of Transportation,
GO Transit and the Toronto Transit Commission.

TRANSPORTATION TOMORROW SURVEY

A Telephone Interview Survey on Household Travel Behaviour in the Greater Toronto Area Conducted in the Fall of 1986

Design and Conduct of the Survey

Prepared for the

Toronto Area Transportation Planning
Data Collection Steering Committee

Participating Agencies:

GO Transit
Metropolitan Toronto
Ontario Ministry of Transportation
Regional Municipalities of Durham, Halton, Hamilton-Wentworth, Peel, and York
Toronto Transit Commission

December 1987

This report was prepared for the Toronto Area Transportation Planning Data Collection Steering Committee by Tranplan Associates and the members of the Transportation Tomorrow Survey Work Group. The principal author was Toivo Rukholm of Tranplan Associates with major input from Dr. Ali Mekky of the Regional Municipality of Peel as well as contributions from Wayne Nicholl of the Toronto Transit Commission, Dave Ferguson of Metropolitan Toronto, and Scott Thompson of the Ministry of Transportation.

The authors would like to acknowledge the efforts of Philomena Noronha and Penny Dimitriou in the preparation of the report.

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PREFACE

The Transportation Tomorrow Survey was a major travel survey conducted in the Fall of 1986, consisting of telephone interviews with a representative sample of over 61,000 households in Metropolitan Toronto and the Regional Municipalities of Hamilton-Wentworth, Halton, Peel, York and Durham. The goal was to develop a reliable data base of household travel patterns for a typical weekday during the survey period.

The project was undertaken and funded jointly by the Ontario Ministry of Transportation and Communications together with GO Transit, the Regional Municipalities of Hamilton-Wentworth, Halton, Peel, York and Durham, Metropolitan Toronto and the Toronto Transit Commission.

This report documents the process leading up to the Transportation Tomorrow Survey, describes the conduct of the Survey and presents summary statistics about the survey process. Furthermore, this report contains the views of the participants on how future surveys can be improved.

ACKNOWLEDGEMENTS

The Transportation Tomorrow Survey has been a product of team work and co-operation among the numerous agencies involved in transportation planning within the Greater Toronto Area.

Nine agencies were represented on the main working committee which planned and conducted the Survey. The individuals who sat on the committee, not only absorbed the committee work into their normal workload, but also spent evenings and in some cases, weekends, making preparations for the survey, and assisting in the field work.

The following people served on the working committee:

Peter Dalton, Chairman	Ministry of Transportation & Communications
Scott Thompson	" "
V.C. Ma	" "
Tom Smith	GO Transit
Dave Ferguson	Metropolitan Toronto
Martin Seekings	Metropolitan Toronto
Mitch Stambler	Toronto Transit Commission
Dave Crowley	Toronto Transit Commission
Wayne Nicholl	Toronto Transit Commission
Ted Gill	Regional Municipality of Hamilton-Wentworth
Andrew Head	Regional Municipality of Hamilton-Wentworth
Ho Wong	Regional Municipality of Halton
Dr. Ali Mekky	Regional Municipality of Peel
John Barnes	Regional Municipality of York
Jeff Mark	Regional Municipality of Durham

The coordinators of the subcommittees were as follows:

Dr. Ali Mekky	Household Survey Team
Dave Ferguson	Finance and Cost Control Team
Mitch Stambler/ Dave Crowley	Coding and Quality Control Team
Ho Wong	Data Processing and Sample Control Team
John Barnes	Trip Diary Survey Team
Martin Seekings	Data Validation Team
Majorie Wallens	Publicity and Public Relations Team

A special mention should also be made of the many evenings put in by Dave Ferguson, Mitch Stambler and Scott Thompson to train interviewing staff.

Apart from the working committee, important contributions to the Survey were made by the following:

Rick Puccini, of the Ministry of Transportation and Communications, Chairman of the Toronto Area Transportation Planning Data Collection Steering Committee, gave the survey enthusiastic management support within the Ministry, thereby gaining for it the level of financing which it required and full participation by all agencies.

Marjorie Wallens, of the T.T.C., with John Knight and Ann Marie Flack of her Public Affairs staff, together with Paul White of the Hamilton Street Railway and John Cooper of the Ministry of Transportation and Communications, prepared and implemented the survey publicity and public relations program.

Barb Samson of Metropolitan Toronto, assisted by Claude Audette, processed the financial paperwork to ensure that the complicated cost sharing arrangement functioned smoothly.

Jim Matsui, of the Environics Group, played a key role in the finalization of the survey design through his work on the conduct of the Pilot Survey.

Professor Gerry Steuart, of the University of Toronto Department of Civil Engineering, contributed to the assessment of survey methodology, particularly with respect to data entry technology.

Rob Manherz of INFO 2000 Inc., developed the software for the innovative automated geocoding of geographic locational data.

Henri Bessette, former Director of Planning for the Montreal Urban Community Transit Commission, provided the working committee with the benefit of Montreal's experience with origin-destination surveys.

Phil Lamont of Lamont Advertising, designed the name and logo for the Survey, along with editing and rewriting of material for the public.

Don Ambrose, Alastair Lynn, and the staff of Consumer Contact Limited, set up the field operations, carried out the telephone interviews and performed the data entry.

Ian Fisher, who was retained by Consumer Contact Limited in the capacity of Chief Supervisor, directed the day-to-day operation of the telephone interviewing.

Mike Wehkind, Assistant to the General Manager, who grew into a job which started with day-to-day administrative matters, but came to include responsibility for the complete geocoding operation.

Toivo Rukholm
Tranplan Associates
Survey General Manager

EXECUTIVE SUMMARY

1. INTRODUCTION AND BACKGROUND

The Transportation Tomorrow Survey was a major travel survey conducted from September until December 1986. It consisted of telephone interviews with over 61,000 households in Metropolitan Toronto and the Regional Municipalities of Hamilton-Wentworth, Halton, Peel, York, and Durham (see Exhibit 1.1, Study Area).

The project was undertaken and funded jointly by the Ontario Ministry of Transportation and Communications (together with GO Transit) and the six regional municipalities inside the study area. In Metropolitan Toronto, participation was split between the Metro Planning Department and the Toronto Transit Commission.

The last comprehensive area-wide travel survey in the Greater Toronto Area was conducted in 1964 (MTARTS Origin-Destination Survey - see Table 1.1). Since 1977, the major public agencies involved with transportation planning in the GTA have been meeting regularly as the Toronto Area Transportation Planning Data Collection Steering Committee (TATPDCSC) to coordinate data collection efforts. In 1985, the TATPDCSC began planning for a major survey to coincide with the mid-term Census in 1986.

2. PLANNING, DESIGNING, AND ORGANIZING THE SURVEY

The overall organization structure of the survey is shown in Exhibit 2.1. The structure reflects the cooperation and team work on the part of the nine transportation planning agencies in order to carry out the survey.

EVENTS IN THE CONDUCT OF THE SURVEY

1977	Formation of the Toronto Area Transportation Planning Data Collection Steering Committee
May 1985	Provincial approval in principle to fund survey
Sept.- Oct. 85	Approval in principle of commitment to the survey by Metro and six Regions
Aug. 85 - Jan. 86	Design of Pilot Survey; selection of contractor to carry out Pilot Survey
March 86	Pilot Survey telephone interviews
April 86	Appointment of Survey General Manager
April 86	Report on Pilot Survey. Review of findings
May-June 86	Contact made with potential contractors to conduct telephone interviewing for main survey.
June 86	National Census
June 27, 86	Contractor selected to conduct interviewing and data entry
Sept. 86	Press Conference held in each Region with Regional Chairman as key spokesman; Metro Toronto news conference with Metro Chairman and Minister of Transportation and Communications.
Sept. 16 - Dec. 13, 86	Telephone interviews with 61,708 households
Sept. 86 - Feb. 87	Data entry and error checking
Oct. 86 - April 87	Geocoding of origin/destination information and transit route data

The preparations for the survey were carried out through special subcommittees (teams) of the TATPDCSC Work Group. Each team was headed by a Team Coordinator who reported to the Main Work Group.

The Publicity and Public Relations Team designed and carried out the publicity program.

The Finance and Cost Control Team designed and oversaw the cost control systems.

The Data Validation Team assembled data and made preparations for the expansion and validation of the survey data.

The Household Survey Team designed and oversaw the conduct of the telephone survey.

The Coding and Quality Control Team designed part of the interviewer training program and management reports on productivity and quality.

The Data Processing and Sample Control Team designed the sample and the data processing system.

The Trip Diary Survey Team designed and oversaw the conduct of a separate more detailed mail-back survey.

3. TELEPHONE INTERVIEWING

The survey interviews were conducted by telephone between September 16 and December 13, 1986. Through a competitive bidding process, (see Section 2.5) a marketing research firm was retained to do the telephone interviewing along with data entry and related tasks.

A sample of households (names, addresses and telephone

TELEPHONE INTERVIEWING STATISTICS

*72 telephones in total were used to conduct the survey.

- 60 telephones in Toronto covering Toronto, Durham, York, and Peel
- 12 telephones in Hamilton covering Hamilton-Wentworth and Halton

*3.5 interviews completed by each interviewer each hour

*Up to 5 attempts made to contact each household

50.7% of interviews completed on 1st call
25.2% of interviews completed on 2nd call
12.2% of interviews completed on 3rd call
6.3% of interviews completed on 4th call
5.6% of interviews completed on 5th call

*Sample Usage

Total Sample Used	102,606
Refusal Rate	25.9%
Response Rate	73.7%
Completion Rate	60.1%

	No. of Completed Interviews(Households)	**% of all Households**
Metropolitan Toronto	34,398	4.0%
Peel	7,661	4.2%
Hamilton-Wentworth	6,549	4.1%
York	4,628	4.6%
Durham	4,388	4.1%
Halton	4,050	4.5%
Unknown/external	34	0.1%
TOTAL	**61,708**	**4.1%**

numbers) was purchased from Bell Canada (see Section 2.4.4). An advance letter signed by the Regional Chairman and the Minister of Transportation and Communications (see Exhibit 2.4) was mailed to all households prior to telephone contact.

Interviewing was conducted from Toronto (60 telephones) and Hamilton (12 telephones) with the Hamilton-Wentworth and Halton Regions being called from Hamilton while the rest of the study area was called from Toronto. Up to five attempts were made to reach a household; a busy signal did not count as an attempt and attempts had to be at least 2.5 hours apart.

The interviewer followed a set script (see Exhibit 2.2) but in order to allow a natural flow, interviewers were encouraged to use the script as a guide, not as a rigid formula. Calls were monitored on a random sample basis by supervisors and by members of the TATPDCSC. The interviewers recorded their responses on a coding form (see Exhibit 2.3) which, after being scheduled by a supervisor, was forwarded to data entry.

4. DATA ENTRY, CODING, AND EDITING

Data entry was accompanied by automated error checking (range checks and logic checks) with errors being referred back for correction (see Exhibit 4.1) for an overall flow chart of the process). Accepted records were forwarded to a team of TATPDCSC personnel for coding the addresses of all origins and destinations in the trip records.

Coding of address data was accomplished using a new automated process developed specifically for the Transportation Tomorrow Survey. The microcomputer based system used Statistics Canada Area Master Files to look up and assign unique XY coordinates to each address. While the coordinate systems (UTM) is capable of locating any point on earth to within one metre, the Area Master Files assign addresses to the centre of the respective blockface.

The geocoding software was developed with the capability of dealing with intersections and monuments (e.g. CN Tower) as well as detailed street addresses. The survey respondents reported their trip ends in the following proportions:

Detailed address	52%
Monuments	30%
Intersections	18%

The system had the ability to "learn" as monuments were added to the monument file and as alias names (e.g. common misspellings) were entered into the system. The success rate varied by the type of address:

Monuments	37%
Intersections	60%
Street Addresses (not a home address)	45%
Home Address	76%

5. SURVEY COSTS

For planning purposes the budget for the survey field work was set at $800,000 plus contributions of services, supplies, and manpower from the participating agencies. In addition to the above, the Ministry of Transportation and Communications also agreed to fund the total cost of a Pilot Survey.

The actual costs for the household telephone interview

FINANCIAL SUMMARY

Source of Funds

1.	Funded through cost sharing agreement	Province Regions	$627,000 200,000	$827,000
2.	Special funding from Province for Pilot Survey and Trip Diary			86,000
3.	Supplies, services, and manpower provided by participating agencies			130,000
	TOTAL:			**$1,043,000**

Summary of Expenditures

1.	Administration	$88,000
2.	Pilot Survey	37,000
3.	Telephone Interviews	501,000
4.	Geocoding	301,000
5.	Other	65,000
6.	Trip Diary	51,000
	TOTAL:	**$1,043,000**

survey were $825,000, plus the supplies, services, and manpower provided by individual agencies estimated to be worth approximately $130,000. The Ministry of Transportation provided additional funding for the Pilot Survey ($37,000) and the Trip Diary Survey (approximately $50,000).

The telephone survey cost approximately $16 per completed household. These costs do not include subsequent costs for processing and analysing the data.

6. CONCLUSIONS AND RECOMMENDATIONS

Some of the conclusions and recommendations about the Survey must be considered preliminary or tentative because only in-depth analysis of the tabulations of the survey responses will show how well the survey process achieved its goals.

6.1 Telephone Surveys

Telephone interviews are a cost effective method of collecting household travel information, although the quality of response remains to be proven.

6.2 Sample

Bell's telephone listings appears to be a good source for drawing the sample for a travel survey. However, it is recommended that in future more emphasis be placed on the design and control of the sample.

6.3 Direct Data Entry

It is recommended that any future survey give serious consideration to using direct data entry. Furthermore, it is recommended that the direct data entry system consist of a full screen representation of the entire questionnaire with full screen editing capabilities, as opposed to the CATI systems used by market research firms. The CATI approach, a page by page system, is tailored to the highly structured interviews common to marketing research surveys; this approach is unsuited to travel surveys where it is important for the interviewer to get an overall understanding of the household's activity pattern and to probe for trips which the respondent may have forgotten to mention.

6.4 Marketing Research Industry

It is recommended that future surveys not necessarily rely on the market research industry to carry out the field work. Equal consideration should be given to some of the other possibilities described in Section 6.6.

6.5 Quality of Telephone Interviewing Staff

The contractor had difficulty attracting enough capable interviewers to staff the 72 telephones. It is felt that the low interviewer wage rate affected the number and the quality of the people available to do the work.

It is recommended that an interviewer hourly wage rate be established at the outset when preparing for any future surveys. This rate would be paid to interviewers whether the survey is done in-house or by an outside contractor. This will require some research and analysis in the labour market place. The established rate should be significantly higher than the prevailing marketing research interviewer rates, possibly 50% higher.

6.6 Contract Out vs. In-House

Starting with the wage rate established as per the recommendation in Section 6.5, it is recommended that the following options be explored:

i) Conduct the survey totally in-house. Professional and technical staff would have to be assigned to the project from within the agencies to direct and manage the preparations and the implementation of the survey. One of the agencies would have to assume a lead role in terms of being the hiring and payroll agency for temporary staff.

ii) Conduct the survey in-house, but use outside firms to perform specific services. For example, an "office overload" type of firm might be engaged to recruit interviewers who would nominally stay on the payroll of the recruiting company which would bill monthly on a cost plus basis.

iii) Use a contractor/consultant in a similar capacity as in 1986.

6.7 Geocoding

The geocoding system proved itself to be cost effective compared to manual coding to traffic zones, while providing a better quality product in terms of precision and future flexibility.

It is recommended that the geocoding system continue to be developed and enhanced with a view to improving its performance while reducing costs. Improvements would include changes to permit use of the system on industry standard microcomputers, and greater emphasis on the following in training interviewers:

i) Use of monuments in describing trip ends.

ii) Use of well defined recording conventions for addresses, monuments and intersections.

iii) Most major telephone travel surveys have been content with making three attempts to contact each household. The Transportation Tomorrow Survey required five attempts; the fourth and fifth attempts were responsible for approximately 12% of the final total of completed interviews. The merits of retaining the fourth and fifth attempts in future surveys will need to be assessed from a detailed analysis of the data produced by these additional attempts. The initial reaction, however, would be to recommend retaining the five attempts, except if it can be shown that these attempts make no significant contribution to the quality of the final data base.

1. INTRODUCTION AND BACKGROUND

The last comprehensive area-wide travel survey in the Greater Toronto Area was conducted in 1964 (see MTARTS in Table 1.1). Between 1964 and 1976 there was very little activity in the area of travel data collection in the Toronto area. In 1977, after a study of transportation data needs, the major public agencies involved with transportation planning began to meet regularly to exchange information and to coordinate data collection efforts. This group became known as the Toronto Area Transportation Planning Data Collection Steering Committee (TATPDCSC). Membership included Metropolitan Toronto, the Toronto Transit Commission, the Regional Municipalities of Durham, York, Peel, Halton, and Hamilton-Wentworth, the Ontario Ministry of Transportation and Communications and GO Transit.

Unable to agree on an overall survey approach, individual agencies proceeded with household and employee travel surveys during the 1977 to 1982 period (see Table 1.1). The TATPDCSC served as a forum for coordinating these data collection activities and sharing the results. However, the limitations of these surveys served to highlight the benefits which could be gained from a common comprehensive area-wide approach.

The experience of the Montreal Urban Community Transit Commission (MUCTC) with origin-destination surveys in 1970, 1974, 1978 and 1982 demonstrated that reliable region-wide planning data could be produced at a very reasonable cost (see Table 1.2). A similar area-wide survey in the Greater Toronto Area appeared to have the potential for reducing overall data collection costs while improving the quality of available data. This information from Montreal served as a catalyst to

TABLE 1.1

PREVIOUS TRAVEL SURVEYS IN THE GREATER TORONTO AREA 1964 - 1986

YEAR	NAME	SURVEY AREA	SAMPLE	MISCELLANEOUS
1964	MTARTS Origin-Destination Survey	Similar to Greater Toronto Area; included Barrie and Guelph; excluded parts of Hamilton-Wentworth	24,000 households, or 3.3% of all hh.s; ranging from 2.8% in Metro to 7.0% in some rural areas	Interviews conducted by telephone, mail and face-to-face. In Metro, 22% by mail, 36% by phone and 42% face-to-face; elsewhere, 45% by phone and 55% face-to-face
1979	Metro Household Travel Survey	Metropolitan Toronto and some adjacent suburban areas	Stratified sample of 3,508 households	Interviews conducted by phone (85%) and face-to-face (15%)
1980	Metro Employee Travel Survey	Metro divided into 45 zones; 3 CBD zones plus 21 others were included in survey	Sample of buildings, sample of companies; 29,000 forms returned from 750 companies	Self-administered questionnaires left with selected employers
1974	Hamilton-Wentworth Travel Characteristics Study	Regional Municipality of Hamilton-Wentworth and Burlington	Sample of 1,634 households; 86% response rate	Telephone survey with face-to-face follow-up
1981	Hamilton-Wentworth Employee Travel Survey	Regional Municipality of Hamilton-Wentworth	Stratified sample; 31,476 forms distributed to 332 employers; 14,137 forms returned, representing 7% of employees in the region	Distributed through employers; mailed back

TABLE 1.1 - CONTINUED

YEAR	NAME	SURVEY AREA	SAMPLE	MISCELLANEOUS
1978-1979	Durham Travel Survey	Regional Municipality of Durham	4,000 households, or 5.4% of all households	Mailout to 7,400 households, interviewed by phone
1983-1984	Durham Travel Survey	Regional Municipality of Durham	5% sample of all households	Telephone survey
1975-1976	Peel Home Interview Survey	Brampton-Mississauga	8% of all households	35,400 postcards distributed; about 8,000 returned
1980	Peel Employee Transportation Survey	Regional Municipality of Peel	25,000 forms completed, or 12% of employees	Forms sent to over 500 companies with 15% of all employees
1979-1980	York Household Travel Survey	Regional Municipality of York	3,800 interviews or 5% of households	Random telephone sample of weekday total trips and demographic data
1981-1982	York Employment End Travel Survey	Regional Municipality of York	Stratified sample of 14,000 or 12% of all employees	Selected employers, self-administered forms at workplace
1977	Halton Transportation Survey	Regional Municipality of Halton	10,000 households approached, 25% response rate	Mailout survey

TABLE 1.1 - CONTINUED

	NAME	SURVEY AREA	SAMPLE	MISCELLANEOUS
1980	Halton Transportation Survey	Regional Municipality of Halton	7,300 forms distributed; 4,599 completed	Mailout survey with follow-up reminder cards

TABLE 1.2

RECENT MAJOR SURVEYS ELSEWHERE IN NORTH AMERICA

CITY	YEAR	DESCRIPTION
Montreal	1970 1974 1978 1982	- Telephone interviews with 4-5% of households from telephone listings; - origin/destination data coded manually to 1400 zones; - results validated by comparing survey estimates with actual observed ridership counts; - survey conducted in-house; - low cost, approximately $10-12 per household in 1982
Vancouver	1985	- Telephone interviews with 5% of households using Montreal methodology; - origin/destination data geocoded to block face level using a digitizer; - survey field work contracted out; - relatively low cost, approximately $20 per household
Houston, Denver, - Minneapolis - St. Paul, and others	1980's	- Small sample size (under 1%); - initial contact by telephone to solicit participation; - mailout of appropriate number of survey forms; - travel data collected over telephone, or by mail; - high cost, $75-125 per household

accelerate activity by the TATPDCSC towards implementing a comprehensive origin-destination survey. Recognizing the importance of the Census as a source of supporting data, the TATPDCSC began working towards an area-wide travel survey to coincide with the midterm Census in 1986, with a view to possibly repeating the survey every five years in step with the Census.

Preliminary planning for the survey began in 1985 as the agencies prepared their 1986 budget requests (based on early cost estimates and assumptions on the level of funding that the Ministry of Transportation and Communications would provide). Special Ministry funding allowed preparations to proceed in late 1985 and early 1986, while municipal councils considered their 1986 Budget Estimates. Eventually all agencies approved funding for the survey.

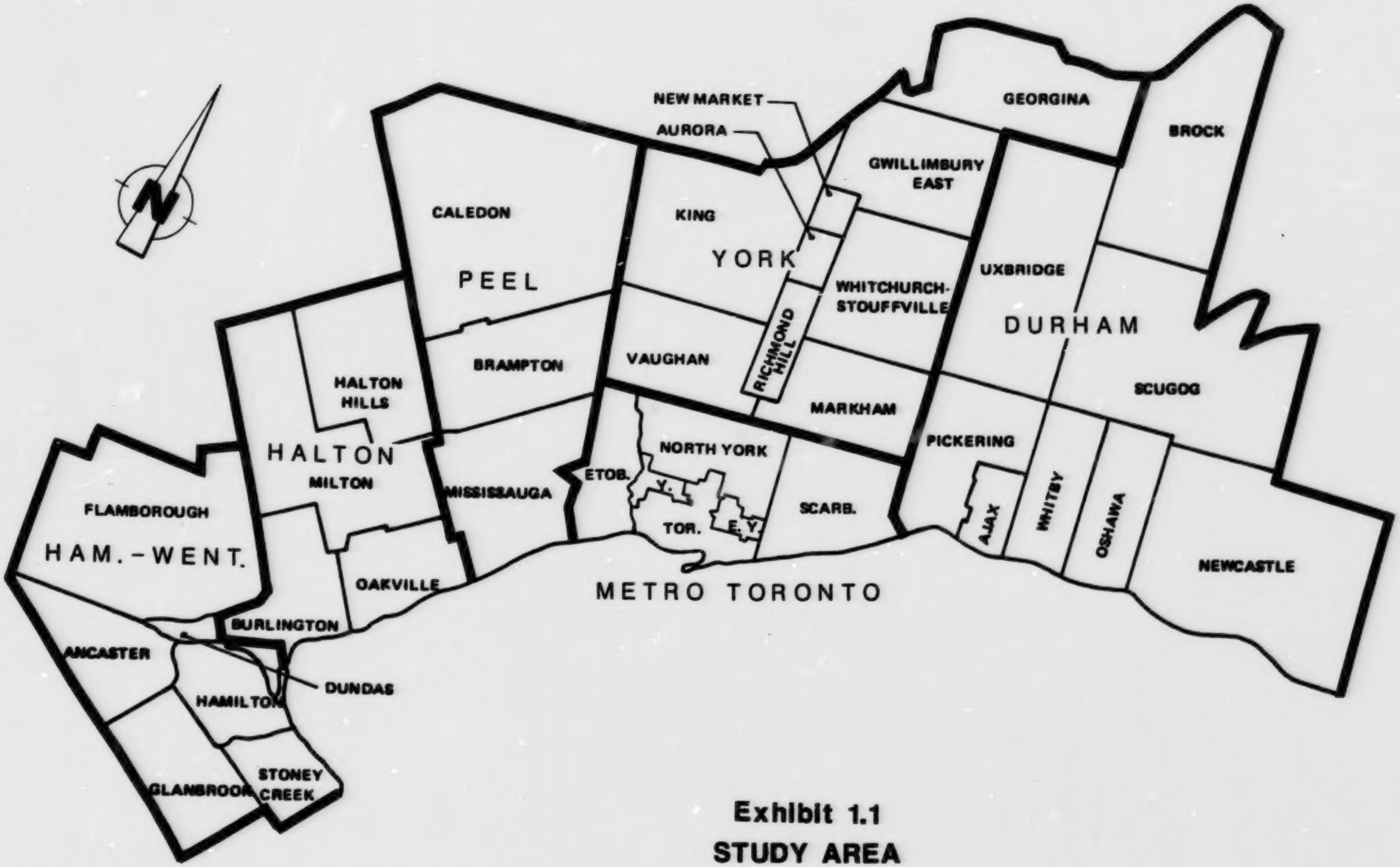


Exhibit 1.1
STUDY AREA

2. PLANNING, DESIGNING, AND ORGANIZING THE SURVEY

2.1 Survey Organization Structure

The Toronto Area Transportation Planning Data Collection Steering Committee (TATPDCSC) formed a Survey Management Team (the Survey Work Group) to manage the Survey. The Survey Work Group included at least one person from each of the nine participating organizations (the Regional Municipalities of Peel, York, Halton, Hamilton-Wentworth and Durham, Metropolitan Toronto, Ministry of Transportation and Communications, GO Transit, and the Toronto Transit Commission).

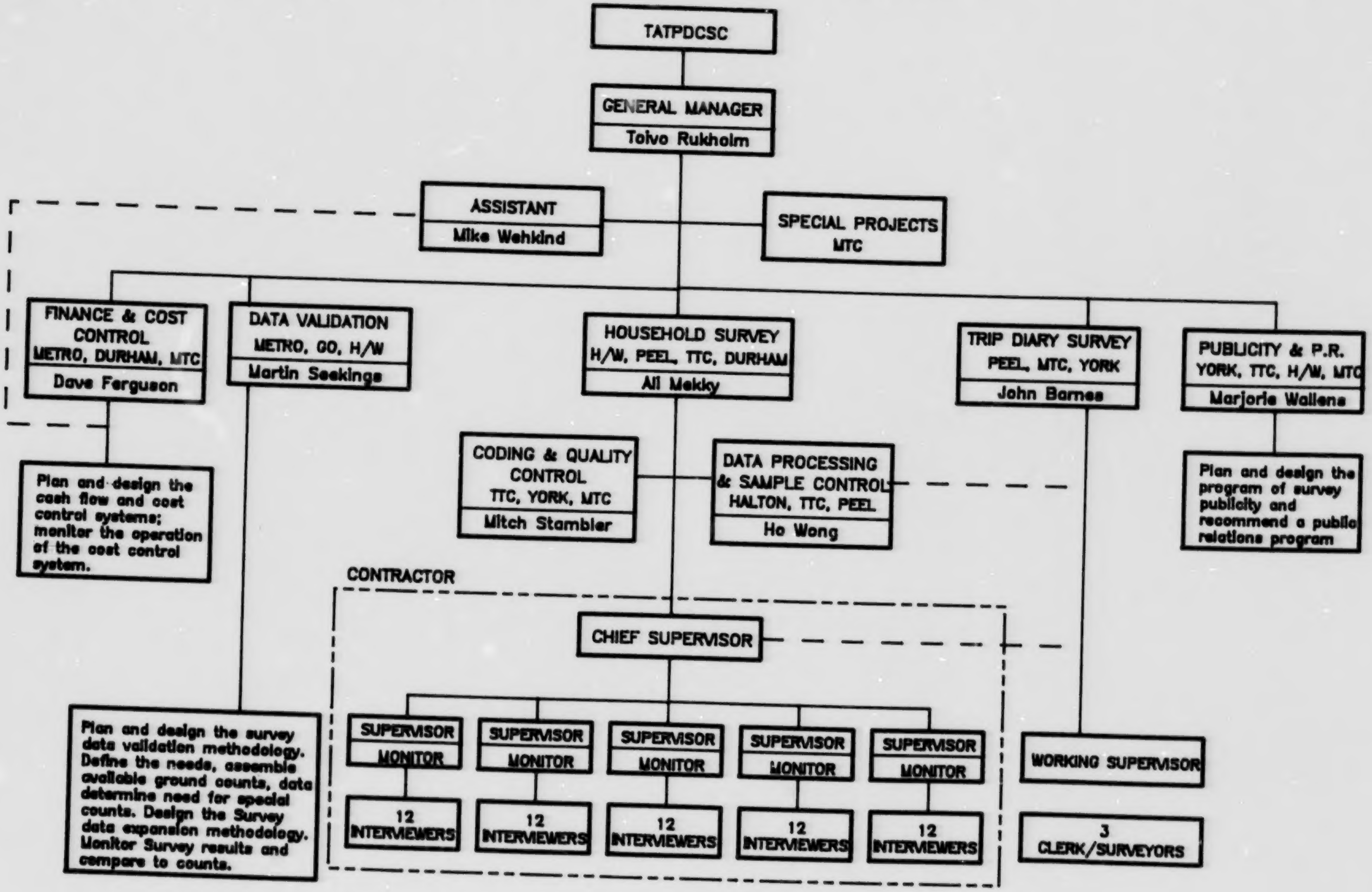
Exhibit 2.1 shows the overall organization structure reporting to the TATPDCSC.

The Survey Work Group engaged a General Manager with an Assistant to carry out the day-to-day management of the project. Each major element of the survey was assigned to a subcommittee of the Survey Work Group. Coordinators of each sub-committee, or team, reported the progress of their team to the Work Group. Major issues, such as Contractor selection, sample size, questionnaire content and plans for the Pilot Survey were also debated by the Work Group.

The Publicity Team was formed to plan and design the program of survey publicity and recommend and carry out a public relations program for the project.

The Finance and Cost Control Team planned and designed the cash flow and cost control systems.

Exhibit 2.1
SURVEY ORGANIZATION STRUCTURE



The Data Validation Team planned and designed the survey data expansion and validation methodology. The group assembled traffic counts, Census data, and other sources of empirical data required for comparison to the survey data. Other duties included the determination of any biases in survey data and the development and validation of an expansion procedure.

The Household Survey Team designed and oversaw the main Household Telephone Interview Survey. Specific duties of this group included the following:

(a) Making logistical arrangements for the conduct of the survey, including investigation of a site for the survey in case the survey was done in-house;

(b) Recommending to the Work Group whether the survey should be done in-house or by a contractor and defining the terms of reference for the contractor;

(c) Recommending to the Work Group the survey interviewing method including an investigation of trip/activity recall frameworks and proxy versus non-proxy interviewing. In addition, policies relating to call-backs and answering machines were established;

(d) Finalization of the questionnaire;

(e) Recommending to the Work Group a short list of contractors to conduct the Household Survey.

The Coding and Quality Control Team was responsible for a part of the interviewer training program, determining management information statistics to monitor the productivity of interviewers and of the quality of the completed interviews.

The Data Processing and Sample Control Team was responsible for obtaining the sample from Bell Canada, and for ensuring that the software for edit checks and geocoding was developed.

The Trip Diary Survey Team was responsible for administering a separate more detailed mail-back survey of about 5,000 households from a stratified sample of previous respondents. The team was responsible for the design of the questionnaire sample selection and the conduct of the survey.

Metropolitan Toronto agreed to assume the role of contracting agent for services and to pay the bills as they were presented. To do so, Metro entered into legal agreements with each of the regional municipalities and the T.T.C. to ensure that there was a binding commitment to reimburse Metropolitan Toronto for their pro rata share of gross costs. Each municipal agency subsequently applied to the Ministry of Transportation and Communications for a 75% subsidy on their portion of the total costs. For details on survey costs, see Section 5 Survey Costs.

The original organization structure was developed with sufficient flexibility to accommodate an in-house operation as well as a situation whereby an outside contractor could be employed to carry out some or most of the field work, (e.g. the printing and mailing of advance letters, the telephone interviewing, data editing and data entry).

2.2 Selection of Survey Methodology

The initial selection of survey methodology dealt with such considerations as interviewing technique (telephone vs. mail) and sampling technique (size, stratification, etc.). The impressive results achieved by Montreal in terms of data quality and cost effectiveness, played a major role in the decision on survey methodology.

The merits of various survey techniques, including "mail out, mail back" surveys, were explored by the Work Group, with the Montreal style telephone interview technique being favoured by the Group as a whole. In terms of the sample, there was some thought given to interviewing a small sample at greater depth, but a larger sample approach, along the lines of Montreal, was selected.

2.3 Pilot Survey[1]

The Ministry of Transportation and Communications retained the Environics Research Group Limited to carry out a nine day Pilot Survey of the household telephone survey during March, 1986. The objectives were to test a draft questionnaire, test the sample procedure, test the effectiveness of an advance letter, assess completion rates and refusal rates, and evaluate methods of data entry. It should be noted that interviewer productivity was not emphasized as an objective of the Pilot Survey, and no particular effort was made to enhance productivity.

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[1] For full details on the Pilot Survey refer to a report entitled "M.T.C. Origin-Destination Survey, Pilot Study" dated April 1986 prepared by the Environics Research Group Limited. Appendix A of this document contains some of the key exhibits from the report prepared by the Environics Group.

Sample households were mailed an advance letter signed by the Deputy Minister of Transportation and Communications (see Appendix A). Some of the households received a 'trip log' with their letter; the trip log is a form for keeping track of trips made on the specified survey day (only these households knew their survey day in advance).

Environics used 19 interviewers and 4 supervisors for the two week pilot. All training was done by Environics. The traditional paper and pencil method was used to record data by staff working in Environics' 14 line main telephone facility in downtown Toronto. However, four of the better interviewers were assigned to work on telephones in Environics administrative office area using microcomputers to enter data directly during the interview. The software for the testing of the direct data entry method was developed by Professor Gerry Steuart of the University of Toronto.

A total of 1482 interviews were completed during the nine day survey period. Of these, 470 were conducted using direct data entry and 1,012 were completed by traditional pencil and paper methods. The major findings were the following:

i) Interviews were completed with 71% of the original list of telephone numbers and 82% of the numbers deemed to be 'eligible';

ii) The refusal rate was 15%; the advance letter appeared to help keep refusals to a moderate level;

iii) The average time for a household interview was nine minutes, compared to six minutes in Montreal;

iv) The average number of trips per person was 2.3;

v) The trip log appeared to have a significant beneficial effect on reducing average interview times, while improving trip recall (more trips reported);

vi) The productivity of the interviewers (approximately 2.5 interviews per hour per interviewer) was much lower than in Montreal (6 interviews per hour per interviewer), but it was still rising as the Pilot came to an end;

vii) Productivity rates for the interviewers using Direct Data Entry were significantly higher than for the others, reaching almost four interviews per hour per interviewer;

viii) Considering the learning curve (Montreal experience indicated three weeks before full production), the results of the Pilot Survey suggested that at least four interviews per hour per interviewer should be achievable, with 4.5 or even higher being quite possible;

ix) The cost per completed interview was $25, compared to the original estimate of $14 (based on Montreal experience and allowing for inflation). The higher cost was due to the lower level of interviewer productivity. Since productivity was not emphasized during the Pilot, it appeared reasonable to assume that it could be improved, thereby reducing costs;

(x) Supervisors spent an average of five minutes per form checking it for completeness and consistency. Automation would help.

In summary, the Pilot Survey confirmed that the Montreal methodology could be applied in Toronto with similar results in terms of such factors as completion rates. The results also suggested that at least four interviews per hour per interviewer should be attainable in Toronto resulting in costs similar to the Montreal levels.

2.4 Finalization of Survey Design

After establishing an organization structure and carrying out a Pilot Survey, the Survey Work Group entered into a period of intense activity to finalize all aspects of the implementation of the telephone survey. With the benefit of the experience from the Pilot Survey, informed analysis and discussion preceded decisions on fundamental issues, such as whether to use outside contractor(s), interviewing methods and standards, interviewer script, the advance letter, sample selection, and whether to use direct data entry. This section of the report documents the decisions which were taken in finalizing the design of the Survey.

2.4.1 Interviewing Standards

In finalizing the telephone interview standards, the Household Survey Team and the Work Group as a whole dealt with such issues as the number of call-backs, answering machines, proxy respondents, and defining which trips were of interest.

Ideally, the interviewer would directly question each individual in the household about their trips, but the time required to do this would significantly increase costs. Alternatively, one member of the household could be questioned about the trips made by all members of the household, but the quality of the trip information could be expected to suffer. The survey team elected to accept proxy interviewing with any adult member of the household on the understanding that, wherever possible, the respondent would be encouraged to ask other members of the household particulars on their trips, or to get them on the phone, if available. In cases where the respondent was unfamiliar with another household member's tripmaking, that member was to be interviewed personally. If the other person was unavailable, a call-back was to be arranged.

It was decided that five attempts would be made to contact each household. A busy signal would not count as an attempt. Trip information collected during a call-back situation was for the day before the call-back or on a Friday if the call-back was made on a Monday. An exception to this occurred when partial information had already been collected for a respondent during the initial interview. In this case, the individual's trips would be completed for the same day as the rest of the household.

If the interviewer encountered a telephone answering machine, three call-back attempts were to be made. On each attempt, the interviewer would leave a message including a toll free telephone number for the respondent to call.

Detailed policies were formulated on which trips should be recorded, and what information should be collected about certain trips. As a general rule, all trips by all household members over five years of age were to be recorded. Trips would be recorded for the 24 hour period between 4:00 AM the previous weekday and 4:00 AM on the day of the interview. However, several exceptions were identified. In the case of walk and bicycle trips, only those trips between home and school and home and work were deemed important enough to record. In addition, the regular travel times of children (13 and under) were not recorded for security reasons.

Trips seen as incidental to the primary trip purpose were not recorded as separate trips. A person stopping off at a doughnut shop to pick up a coffee on his way to work is an example of this. However, if the person stopped for breakfast, then the trip from home to the restaurant and from the restaurant to work, would be coded as two separate trips. Discretion on the part of the interviewer was required in distinguishing between a stopover and a legitimate trip.

For a respondent involved in an occupation which required driving to many places in one day, only the first and last work trips were recorded. Those involved in police work, bus drivers, taxi drivers and truck drivers are all included in this category.

2.4.2 Survey Questionnaire/Script

The script developed for the Pilot Survey was modified for the main survey. The Household Survey Team, the main Work Group and the telephone survey contractor all participated in the finalization of the script and the development of the coding form.

The script used in the main survey is shown as Exhibit 2.2, while the coding form is shown as Exhibit 2.3.

The script was subsequently translated into Italian, Portuguese, Spanish, German, Greek, Cantonese, French, Polish and Ukranian. TATPDCSC members identified staff in their agencies or in local area municipalities who had sufficient transportation planning background and

TELEPHONE INTERVIEW SCRIPT

"Hello, my name is ______________ calling for the Transportation Tomorrow Survey. Is this the ______________ household at ________________?

change or correct address if necessary.
If business, verify phone number and ask if residence.

"By now, you should have received a letter explaining the purpose of this Provincial and Regional Government survey on travel patterns, and telling you to expect my call. I would like to proceed with the interview now if it is convenient. Everything I ask you will be strictly confidential."

answer questions or arrange call-back if respondent is unable to provide travel information.

"First, I'd like to ask you some background questions about your household."

1. "Do you live in an house or an apartment?"
2. "How many people normally live in your household?"
3. "How many motor vehicles such as cars, trucks, or motorcycles do the members of your household have for their personal use?"
4. "How old are you (he/she)?" **Record sex**
5. "Do you (she/she) have a driver's licence?"
6. "Are you (he/she) employed?"
    (Yes) - At home or outside?
    Full-time or part-time?
    (No) - Are you (he/she) a student (other)?
7. "OK..... the next person in the household. Who would that be?"

"Now I would like to ask you about the trips that you (and the other members of your household) made yesterday (or Friday)."

8. "On your (his/her) first trip, did you (he/she) leave from home?"

8a **If not** "From where?"

9. "Where did you (he/she) go?

"Did you go directly to __________ or did you stop on the way?"

if stop was for a primary trip purpose, make the stop a destination, and record the travel from that stop to the next destination as another separate trip (if intersection, record specific corner)

"Where is that?"
"What town/city/community is that in?"

10. "How did you (he/she) get there?"
    if transit, ask for route(s)/operator(s)

11. "What time did you (he/she) begin that trip?"
12. "What was the purpose of that trip?
    if not already evident

13. "Where did you (he/she) go next?"
    remember to probe for trips during day and after last recorded trip

14. "Now I'd like to ask you about (the next person's) trips yesterday.?

"THANK YOU FOR YOUR CO-OPERATION"

Exhibit 2.3 a

TELEPHONE INTERVIEW CODING FORM

CONSUMER CONTACT LIMITED

INTERVIEW STATUS

CASE NUMBER ☐☐☐☐☐

E.S.U. # ☐☐☐

STUDY #751-86 2F

	ATTEMPT				
DATE:					
TIME:					
	FIRST	SECOND	THIRD	FOURTH	FIFTH
Completed at address stated	11	21	31	41	51
Completed at different address/with different name but same telephone number	12	22	32	42	52
*No answer (line busy:)	13	23	33	43	53
Number not in service	14	24	34	44	54
Business number	15	25	35	45	55
Language not in survey/ unknown	16	26	36	46	56
Survey language requires call-back	17	27	37	47	57
Refusal	18	28	38	48	58
Call-back	19	29	39	49	59
Incomplete Information	10	20	30	40	50

COMPLETION ☐☐

* Answering Machine? YES .. Y
NO ... N

SAMPLE # ☐☐ REGIONAL MUNICIPALITY ☐

AFFIX

HERE

COM. NAME ☐☐☐☐☐☐☐☐☐☐

DWELLING TYPE ☐

Name (if incorrect): ____________________

Address (if incorrect): ____________________

Language (Write in): ____________________

Call-back time/date: ____________________

Call-back time/date: ____________________

Name: __________

Interviewer's Name: ____________________

Interviewer's Number: __________

Completed according to instructions
(Interviewer's Signature)

Number of Sheets for this
household (Write in): __________

Exhibit 2.3 b

TELEPHONE INTERVIEW CODING FORM

CONSUMER CONTACT LIMITED

1986 Transportation Tomorrow Survey

STUDY #751-86

2F

Date of Trip

MONTH		DAY	

Language ☐

BLANK ☐

Number of Persons ☐☐

Number of Vehicles ☐

P #	NAME	RESP.	AGE	SEX	LICENCE	EMPLOY STATUS
01						
02						
03						
04						
05						

P #	NAME	RESP.	AGE	SEX	LICENCE	EMPLOY STATUS
06						
07						
08						
09						
10						

EMPLOYMENT STATUS CODES

F = WORK FULL-TIME
P = WORK PART-TIME
S = STUDENT
N = WORK AT HOME
O = OTHER
DK = NOT KNOWN

TRIP PURPOSE CODES

W = WORK
H = HOME
S = SCHOOL
M = MARKET OR SHOPPING
P = PERSONAL BUSINESS
E = ENTERTAINMENT/SOCIAL/RECREATIONAL
F = FACILITATE OR SERVE PASSENGER
O = OTHER
DK = NOT AVAILABLE

INTERVIEWER	Date of Completing Interview		INTERVIEWER SUPERVISOR	DATA ENTRY		TOTAL NUMBER OF HOUSEHOLD TRIPS
	MONTH	DAY		CLERK	VERIFIER	

ADDRESS TYPE

A = ADDRESS
M = MONUMENT
I = INTERSECTION
H = HOME
L = LAST DESTINATION
P = PREVIOUS ORIGIN

TRAVEL MODE CODES

B = BUS (All Busses)
S = SUBWAY (All Trains)
D = AUTO DRIVER
P = AUTO PASSENGER
T = TAXI
C = BICYCLE
W = WALK
M = MOTORCYCLE
O = OTHER
DK = NOT AVAILABLE

TRANSFER POINT

PUBLIC TO PRIVATE
(VICE VERSA)
OR
PROVINCE EXIT/ENTRY POINT
T = PREVIOUS TRIP TRANSFER POINT

PERSON #	TRIP #	ADDRESS TYPE	ORIGIN	TRIP PURPOSE	TRIP START TIME	ADDRESS TYPE	DESTINATION	FIRST MODE	SECOND MODE	THIRD MODE	FOURTH MODE	FIFTH MODE	ADDRESS TYPE	TRANSFER POINT
			NE NW SE SW				NE NW SE SW							
			NE NW SE SW				NE NW SE SW							
			NE NW SE SW				NE NW SE SW							

knowledge of the specified languages to be able to produce a good technical translation. The survey contractor was required to hire at least one person who was sufficiently fluent in each of the specified languages to be able to conduct an interview using the translated script.

2.4.3 Advance Letter/Trip Log

The purpose of the advance letter was to introduce the survey, outline the process, inform the household to expect a telephone call during the next few evenings (or during the day on Saturdays) at the specified times and to impress on the household the legitimacy and importance of the interview. It was signed by both the Minister of Transportation and Communications and the Chairman of the Region in which the household was located. The letter is shown in Exhibit 2.4 in its final form.

The Pilot Survey concluded that the trip log shown in Appendix A had a major impact on respondent recall, increasing the number of trips reported and reducing the time required to report them. While the inclusion of the same type of trip log in the main survey was highly desirable, the logistics involved with scheduling trip days and interview calls on a large scale precluded its implementation.

Since the Pilot Survey showed that there appeared to be a benefit even if the person

ADVANCE LETTER

THE TRANSPORTATION TOMORROW SURVEY

H. Resident
10 New Street
Anytown, Ontario
Z9Z Q1Q

To improve roads and transit services, we are conducting a special and very important survey. The purpose: collect information on your travel habits.

We're asking for your help.

The survey process is interesting. You'll be telephoned at home and asked to spend about seven minutes answering questions by a professional interviewer from Consumer Contact Ltd. The interviewer will call in the next few days. On week nights, the time will be between 5:00 p.m. and 9:45 p.m. If the interviewer calls on a Saturday, it'll be between 10:00 a.m. and 5:00 p.m.

Most of the questions will be about your household travel on the day before the call. We'd like to know about where and when trips were taken so we can get an accurate picture to tell us how to plan improved transportation services and facilities. In addition, we'll be asking the usual questions about age, employment, household size, etc.

Enclosed, you will find examples of the types of travel questions we will be asking you about each member of the household 6 years of age and over.

All information will be kept strictly confidential. No information will be released in such a way that it could be traced to an individual household. However, the combined figures from all the interviews should shed new light on what's needed in the future.

If you have any questions, please call the Public and Safety Information Branch of the Ministry of Transportation and Communications in Toronto at 235-3501 or toll free 1-800-268-0637 between 8:30 a.m. and 4:30 p.m.

We'd like to extend our personal thanks for your assistance in this project. Your help means better roads and better transit in the future.

Yours sincerely

Gary Herrema
Chairman
The Regional
Municipality of
Durham

Ed Fulton
Minister of
Transportation and
Communications

Attachment

Ontario

A survey conducted for:
the Regions of Durham, Halton, Hamilton-Wentworth, Peel and York; Metropolitan Toronto, Ministry of Transportation and Communications, GO Transit and the Toronto Transit Commission.

had not recorded his trips in the trip log, it was hypothesized that having a clear visual picture of what the interviewer was going to ask, helped people prepare for the questions. Accordingly, the decision was made to include a trip log with the advance letter in the form of an example of the type of data which was required. This trip log, shown in Exhibit 2.5, was an attachment to the advance letter which was sent to all households.

2.4.4 Sample Selection

Generally, the selection of a sampling technique depends upon the following factors:

a) the purpose for which the data will be used;
b) the degree of accuracy required;
c) the population size; and
d) the budget

The geographical area encompassed by the survey was determined at the study's inception. It contained the populations within Metropolitan Toronto and the Regional Municipalities of Peel, York, Durham, Halton and Hamilton-Wentworth.

There were approximately 1.5 million households in the study area in 1985. Based upon the United States Bureau of Public Roads guidelines (see Table 2.1), a 4% completed sample of all households would be adequate. Montreal's experience with

Exhibit 2.5

TRIP LOG

TRANSPORTATION TOMORROW SURVEY

We will be asking you about travel by members of your household.

Examples of the questions are:
Where did you go?
What was the purpose of this trip?
What time did you leave?
How did you get there?

Here are some examples of the kind of information we will need

Person Identification	Trip No.	From Where?	To Where?	Purpose of Trip	Start Time?	Method of Travel (and routes for Transit)
Examples: Self, Wife, Husband, Son Daughter, Room-mate, or first name	1,2, etc.	Please give building name or exact address if possible	Please give building name or exact address if possible	Examples: Work, School, Shopping, Recreation, Entertainment, Pick-up/Drop-off Passenger, Personal Business, Return Home	Please give precise time and a.m. or p.m.	Examples: Bus, Car Driver, Car passenger, GO Bus, GO Train, Bloor-Danforth/ Yonge Subway, Streetcar, Bicycle, Walk, Taxi.
Self	1	Home	10 Peel Centre Dr.,Brampton	Work	8:35 a.m.	Car passenger
	2	10 Peel Centre Dr.,Brampton	1201 Wilson Ave.,North York	Personal Business	1:30 p.m.	Car passenger
	3	1201 Wilson Ave.,North York	Yonge & Bloor (N.W.),Toronto	Shopping	3:25 p.m.	Wilson Bus (Route 96) Yonge Subway
	4	Yonge & Bloor (N.W.), Toronto	Home	Return Home	5:30 p.m.	Bloor Subway, Car pass.
Spouse	1	Home	U of T (Galbraith),Toronto	School	8:00 a.m.	Bicycle, Yonge Subway
	2	U of T (Galbraith),Toronto	Home	Return Home	3:00 p.m.	Yonge Subway, Bicycle
Son	1	Home	Gosford P.S.,North York	School	8:25 a.m.	Walk
	2	Gosford P.S.,North York	Jane/Finch Mall,North York	Entertainment/Social Recreational	3:30 p.m.	Jane Bus (Route 35)
	3	Jane/Finch Mall,North York	Home	Return Home	8:15 p.m.	Jane Bus (Route 35)
Daughter	1	Home	Yorkdale Plaza,North York	Shopping	10:10 a.m.	Car driver
	2	Yorkdale Plaza,North York	Bramalea City Centre, Brampton	Shopping	1:00 p.m.	Brampton GO Bus
	3	Bramalea City Centre, Brampton	Home	Return Home	7:10 p.m.	Brampton GO Bus, Car driver

TABLE 2.1

MINIMUM AND RECOMMENDED SAMPLING RATES
U.S. BUREAU OF PUBLIC ROADS

Population	Minimum Percentage	Recommended Percentage
Less than 50,000	10.0	20.0
50,000 - 150,000	5.0	12.5
150,000 - 300,000	3.0	10.0
300,000 - 500,000	2.0	6.6
500,000 - 1,000,000	1.5	5.0
More than 1,000,000	1.0	4.0

using the results of its surveys, particularly in estimating major transit route ridership, suggested that a 4-5% sample was satisfactory.

Based on costs incurred during the 1982 Montreal Survey, adapted to 1986 conditions in Toronto, cost estimates were prepared for a number of sample sizes and interviewer productivity rates. The results indicated that a 4-5% sample appeared to be possible with an $800,000 budget.

After a great deal of deliberation, the TTS participants agreed to apply a uniform sampling rate to all the municipalities in the study area. The target would be a 5% completed sample across the study area, with 4% being the acceptable minimum sample.

While it was the intention from the beginning that the sample be drawn from Bell Canada's data files, it was also acknowledged that there are problems with this data source. First, there are households with no telephone, although the most often quoted figures suggest that fewer than 2% of households fall into this category. Second, households with unlisted telephones would not be included in the sample. The Socio-Economic Section of the Regional Municipality of Peel Planning Department acquired from Bell Canada the number of listed and unlisted numbers from one switch (the first two digits of the telephone number) in each of several urban areas. The information which is summarized in Table 2.2 shows a relatively uniform distribution of unlisted telephone households throughout the Study Areas with no obvious correlation with the socioeconomic status of a neighbourhood.

Bell Canada had two sources from which the sample could be drawn. Tele-Direct, a Bell subsidiary, could supply names and addresses of those residential subscribers listed in the white pages of the telephone directories. Bell Canada Marketing Research (BCMR) could supply similar information from Bell's residential billing files. Tele-Direct could provide information which was current to the end of April, while Bell Canada Marketing Research billing files were current to June, 1986. The latter was chosen.

The Survey Work Group's intent was to obtain a uniform sample of 125,000 households selected in a systematic sequential method from Bell's master file after being sorted by postal code. The number of households in the sample was based on the estimated requirement to produce completed interviews with 5% of all households. The actual sample, however, was selected in the following manner:

1. The universe was defined as all postal codes in the study area (see Table 2.3);

TABLE 2.2

Proportion of Unlisted Telephone Numbers

Location of Switch	Total Residential Services	Number Unlisted	% Unlisted
Toronto-Adelaide	23,584	2,210	9.4
Toronto-Don Mills	29,765	2,972	10.0
Toronto-Finch	39,164	3,250	8.3
Toronto-Lawrence	21,412	2,676	12.5
Cooksville	45,281	5,162	11.4
Malton	9,899	1,059	10.7
Oakville	20,166	1,351	6.7
Brampton	19,215	1,863	9.7
Markham	10,515	673	6.4
Oshawa	47,573	3,235	6.8
Newmarket	13,066	750	5.7
Ancaster	5,219	300	5.7
Hamilton-Central	42,292	4,483	10.6
Hamilton-Mountain	41,542	3,905	9.4
Total	368,693	33,889	9.2

Source: Bell Canada

TABLE 2.3

Postal Codes in Sampling Universe

Rural		Urban
LOA	1E0	L1C to L1X
	1H0	
	1J0	L3P to L3T
		L3Y
LOB	1A0 to 1J0	
	1L0 to 1P0	L4A to L4G
LOC	1A0 to 1K0 (all)	L4P
		L4T to L4Z
L0E	1A0 to 1T0 (all)	
		L5A to L5T
L0G	1H0 to 1K0	
	1M0 to 1V0	L6H to L6M
	1X0	L6S to L6Z
L0H	1A0 to 1P0 (all)	L7A
		L7E
L0J	1A0 to 1K0 (all)	L7G to L7J
		L7L to L7V
L0K	1A0	
		L8E to L8W
L0N	1A0 to 1E0	
	1K0	L9A to L9J
	1P0	L9T
L0P	1A0 to 1N0 (all)	M-- (all)
L0R	1A0	
	1C0	
	1H0 to 1L0	
	1P0	
	1R0	
	1T0 to 1X0	
	1Z0	
	2B0	
	2G0	
	2H0	
	2K0	
	2L0	
NOB	1L0	
	2J0	
	2K0	

2. From Bell Canada's master file, separate files were created for Metro and non-Metro residences. In creating the non-Metro file, all listings outside the 416 Area Code were excluded, while approximately 76,500 non-resident listings were not excluded from the Metro file;
3. Based on the households in each file, Bell determined the size of the sample which should be drawn from Metro and from outside Metro. The following table gives this breakdown;

	Total Households	**% of Total Households in the GTA**	**Sample Required**
Metro	966,000	59.5%	74,375
Non-Metro	657,777	40.5%	50,625
Total:	1,624,000	100.00%	125,000

4. Bell Canada randomly selected the sample from each file;
5. Both files were combined, sorted by postal code and sent to the printer;
6. The printer consecutively numbered the records 1 to 60 on a repeating basis to create 60 geographically matched samples.

The fact that approximately 76,500 non-resident listings were included in the Metro file resulted in Metro being oversampled. Metro should only have made up 57.0% of the total sample instead of 59.5%. Fortunately, this was not a major problem because the completion rates within Metro were lower than elsewhere. However, the elimination of all records having non-416 Area Codes from the final draw resulted in several areas on the fringes of the study area having 519 and 705 Area Codes not being sampled (see Table 2.4). In order to correct this oversight, Bell Canada supplied a supplementary sample of 735 households in the 519 and 705 calling areas.

The actual sampling rate in each Forward Sortation Area (FSA)[1] was reviewed to determine if the random sampling process resulted in any significant undersampling within any part of the Study Area. Table 2.5 shows those FSA's where the drawn sample was lower than 7.5%. Only one area within Metropolitan Toronto is included in the list - Rexdale (M9W) at 6.8%; 23 areas from outside Metro are on the list, but most of these have samples over 7.0%. Overall, it was concluded that the drawn sample was acceptable.

---

[1] **The Forward Sortation Area or FSA is the geographic area defined by the first three characters of the six digit postal code.**

TABLE 2.4

Fringe Areas Excluded from Original Sample

Postal Code	No. of Households Excluded	Area	Regional Municipality
519 Area Code			
L7J (all)	3291	Acton	Halton
L0N 1A0	427	Alton	Peel
L0N 1B0	154	Belfountain	Peel
L0P 1H0	34	Limehouse	Halton
L0R 1T0	535	Lynden	Hamilton-Wentworth
L0R 1X0	80	Rockton	Hamilton-Wentworth
L0R 1Z0	90	Sheffield	Hamilton-Wentworth
N0B 1L0	150	Branchton	Hamilton-Wentworth
N0B 2K0	130	Rockwood	Halton
705 Area Code			
L0C 1L0	97	Udora	Durham/York
L0E 1E0	1021	Cannington-	Durham
L0E 1N0	1160	Pefferlaw	Durham/York
L0K 1A0	1555	Beaverton	Durham
	8724[1]		

---

[1] **A supplementary sample of 735 households was drawn from this universe of 8724 households.**

TABLE 2.5

Areas with Gross Sample under 7.5%[1]

	FSA	Total Households[2]	Households[2] in Sample	Sampling Rate
(Rexdale)	M9W	10568	718	6.8%
(Kleinberg, etc.)	L0J	2420	165	6.8%
(Ajax)	L1W	5412	401	7.4%
(York)	L3R	9141	666	7.3%
	L3S	427	28	6.6%
	L4A	449	25	5.6%
(Mississauga)	L4T	9933	731	7.4%
	L5A	17518	1299	7.4%
	L5E	4069	300	7.4%
	L5H	5612	404	7.2%
	L5K	4202	291	6.9%
(Oakville)	L6K	5358	391	7.2%
(Brampton)	L6T	13190	980	7.4%
(Bolton)	L7E	387	28	7.2%
(Hamilton)	L8H	11319	839	7.4%
	L8J	2206	159	7.2%
	L8K	13474	987	7.3%
	L8L	12695	911	7.2%
	L8N	7348	497	6.8%
	L8R	4617	339	7.3%
	L9A	8202	592	7.2%
	L9C	12317	885	7.2%
	L9J	353	23	6.5%
(Branchton, Rockwood)	N0B	595	37	6.2%

---

[1] List of all Postal Code Areas (FSA's) with a universe of more than 200 households (telephone listings) and a gross sampling rate less than 7.5%.

[2] Households are defined as those which are in Bell Canada's billing file.

2.4.5 Direct Data Entry

Conventional methods of data entry require the interviewer to record answers from respondents on coding forms. These coding forms are usually scanned by supervisory personnel and are then keypunched and verified to a computer file. The survey records can subsequently be checked by editing and logic checking software.

Direct Data Entry (D.D.E.) allows the interviewer to enter a respondent's answers directly to a computer file via a keyboard. This D.D.E. method would be under the control of a software package which displays the screen(s), accesses survey records for input, and allows updates. It can also perform logic tests as the interviewer inputs the data, store completed interviews and perform quality control checks. In addition, the system may allow for the tracking/scheduling of call-backs and may have auto dialling capabilities. Several computer configurations could support D.D.E. This includes a minicomputer with terminals, a microcomputer having multi-user capabilities with terminals, a large microcomputer acting as a file server connected to microcomputers in a Local Area Network (L.A.N.) environment, and stand-alone micros. No matter how D.D.E. operates, every interviewer is required to have either a terminal or a microcomputer on his or her desk.

Both D.D.E. and the conventional methods were considered as viable options for use in the survey by the Survey Work Group. The selection of one of these methods became a major issue in the selection of a contractor. The Work Group examined the use of D.D.E. in the Pilot Survey and weighed the advantages and disadvantages of each method, many of which are shown in Table 2.6.

Of the short-listed contractors, four indicated having had experience with some form of direct data entry including Computer Assisted Telephone Interview (CATI) systems. However, only one of these companies recommended its use in the survey. In the end, the choice came down to two competing bids at very comparable cost, one proposing a conventional pencil and paper approach while the other proposed using a CATI system. The majority of the Survey Work Group members opted for the company proposing the conventional method because of the following reasons: the overall good impression created by the winning bidder, the concerns about the risk factors associated with the proposed CATI approach, the tight schedule, the fact that D.D.E. had not been used in any major travel survey, and that no contingency plan was offered in case of its failure.

TABLE 2.6

DIRECT DATA ENTRY VERSUS THE CONVENTIONAL METHOD

	DIRECT DATA ENTRY	CONVENTIONAL METHOD
ADVANTAGES	a. Data is edit checked immediately. The transition into data analysis is easier; b. No keypunching is required eliminating this as a source of error and expense; c. Administrative and quality control reports are readily available, meaning that survey management is more efficient; d. Keeping track of paper coding forms is not necessary; e. Call-backs can be monitored more easily.	a. It is easier to train interviewers; b. Less sophisticated site location and furniture is required; c. Less lead time prior to the start of the survey is required.
DISADVANTAGES	a. Start up time for the survey is greater; b. Training time for interviewers is greater. Interviewers must become keyboard literate; c. Locating a site because of the computer equipment and acquiring furniture becomes difficult and expensive; d. Computer hardware must be acquired and software must be developed; e. It has never been used in a major travel survey.	a. Survey records must be keypunched, then software and hardware must be available for edit checking; b. Administrative and quality control reports may not be readily available; c. Necessary to keep track of large numbers of complete and incomplete coding forms.

2.5 Selection of Contractor

The draft Terms of Reference for a contractor to carry out the telephone interviewing and data entry were prepared in mid-May, 1986, and approved by the TATPDCSC on May 21, 1986. The final Terms of Reference are included as Appendix B.

Within the limited time available, every effort was made to give all potential contractors equal opportunity to offer their services. The process began on May 21, 1986, and culminated with the selection of the successful contractor on June 27, 1986. Table 2.7 gives a summary overview of the selection process.

All firms thought to have had experience in conducting telephone interview surveys in the Toronto area were identified through the following sources:

i) suggestions from the members of the Survey Work Group;
ii) the association of professional market research firms, which provided its membership list, as well as the names of some of the larger non-member firms;
iii) the yellow pages of the telephone directory;
iv) firms which had already heard of the survey and had expressed their interest.

Over 30 firms were identified. Each firm was contacted by telephone May 26th to May 28th, informed of the upcoming survey and asked whether they would be interested in considering submitting a proposal to carry out the field

TABLE 2.7

SUMMARY OF CONTRACTOR SELECTION PROCESS

May 21, '86	Draft Terms of Reference for contractor approved by TATPDCSC
May 21 - 26	List of all potential contractors prepared (over 30 companies on original list)
May 26 - 28	All firms contacted by phone to determine interest and to notify of June 2nd information meeting
May 28	All interested companies (28) delivered letter by hand confirming invitation to June 2nd meeting and copy of draft Terms of Reference
June 2	Information meeting for all interested companies; 24 people representing 18 companies in attendance. Full briefing on purpose of survey, major requirements, selection process. Invited to submit credentials
June 2 - 9	Finalization of Terms of Reference
June 9	Eight sets of credentials received (total of 13 companies)
June 10	Credentials evaluated by agency staff; three eliminated; 5 forwarded final Terms of Reference, invited to submit full proposals
June 16 - 20	Agency staff inspect facilities of five firms, answer questions on Terms of Reference.
June 23	Proposals received from five firms; circulated to agency staff
June 26	Proposals evaluated by agency staff; three eliminated; two asked to be interviewed on June 27 (both given same list of questions to respond to during interview)
June 27	Two finalists interviewed; final evaluation, selection of preferred Contractor; decision ratified by Steering Committee meeting in the afternoon.

work. A few companies declined. For those that were interested, the name of the appropriate contact person was noted and they were advised over the telephone of an information meeting on June 2, 1986. A personalized letter addressed to the contact person, together with a copy of the draft Terms of Reference for the work to be contracted out, was subsequently delivered by hand on May 28th to each of the 28 firms which expressed an interest. The letter confirmed the information already given over the telephone.

Twenty-four persons representing eighteen companies attended the meeting on June 2, 1986. During the meeting the General Manager outlined the key elements of the Terms of Reference with emphasis on the following:

i) It was a requirement that the Contractor's Chief Supervisor had had directly relevant travel survey experience;
ii) The importance of the interviewer productivity rate in estimating costs and the variance in interviewer productivity between Montreal, Vancouver, and the Pilot Survey in Toronto;
iii) The Contractor was welcome to submit a proposal to carry out the survey using conventional pencil and paper methods and/or using direct data entry on computer terminals or free standing microcomputers;
iv) The Contractors were encouraged to consider forming consortia.

The General Manager described the proposed contractor selection process and asked for input on the method and the timing. There appeared to be general agreement on the approach as proposed; the suggestions made on the timing were accepted by the General Manager.

Those in attendance were invited to formally submit their credentials for undertaking the project and June 9, 1986, was established as the last day for the submission of credentials. Eight sets of credentials were received, six of which were for individual companies, while one was for a consortium of two companies and another was for a consortium of five companies. In addition to the 13 companies participating in presenting their credentials, five companies advised that they would not be submitting credentials and there was no response from three of the companies that attended the information meeting.

The eight sets of credentials were evaluated in detail by the Household Survey Team on June 10, 1986, using a "rating form" prepared for the purpose. Through this process three were eliminated; the remaining five were invited to submit detailed proposals for the project by June 23, 1986. The five candidates were also advised to keep June 27th open for interviews if needed.

During the week of June 16th, members of the client agencies visited each of the five companies/consortia to inspect their facilities, meet their staff and to answer any questions on the proposed survey. The impressions gained during these visits formed a part of the subsequent rating of the five proposals.

The Household Survey Team met on June 26, 1986, to evaluate the five proposals. After a lengthy and detailed rating process, the Team recommended to the Work Group that three companies be eliminated from further consideration and that the remaining two companies be interviewed.

The two remaining proposals had very similar costs, but differed greatly in their methodology with one proposing a CATI (computerized) system, while the other proposed a conventional pencil and paper approach. For the reasons mentioned in Section 2.4.5, the decision was made immediately after the interviews on June 27th to offer the project to Consumer Contact Limited (CCL), the firm which proposed a conventional pencil and paper approach.

2.6 Selection and Training of Field Staff

The Survey Work Group recognized that the telephone interviewers would be the key link between the respondent and the end-users of the data. Consequently, considerable emphasis was put on the hiring and training of staff in the Survey Terms of Reference to which contractors were requested to respond.

Sections 2.7 and 2.8 of the Terms of Reference stated:

" 2.7 Rates of Pay

The TATPDCSC is concerned about the quality of staff and the turnover of staff (particularly interviewers, but also supervisors and others) who will be employed by the Contractor to carry out the Survey. The rates of pay and any incentive plan will have a bearing on a Contractor's ability to attract and retain good personnel.

It is a requirement that the proposed rates be listed in the proposal. Any incentive plan for minimizing turnover should be described in the proposal.

2.8 Staff Training

The TATPDCSC considers training of the interviewers and their supervisors, and the checkers, correctors and coders to be critical to the success of the survey. TATPDCSC personnel are to be given a minimum of four hours during the training process to instruct the Contractor's staff on the purpose of the Survey, the unique characteristics of conducting an Origin-Destination Travel Survey, and how to deal with a range of possible travel situations. The Contractor would be responsible for other aspects of the training, including instructions on administrative procedures, general instructions on dealing with the public, etc.

TATPDCSC personnel will have the right to reject any of the staff after the training program."

During the course of the Pilot Survey it became apparent that training interviewers for origin-destination travel surveys is significantly different from training them for the types of surveys normally conducted by marketing research firms. In particular, the single evening five hour session consisting wholly of classroom instruction, which served as the training program for the Pilot Survey, did not adequately prepare the interviewers.

Consumer Contact Limited, in responding to the Terms of Reference proposed a training program of 16 hours over four evenings, broken down as follows:

3 hours - Introduction, general interviewing/sampling techniques;
4 hours - TATPDCSC orientation;
5 hours - Specific questionnaire study and "role playing" practice interviews;
4 hours - Practice "live" interviews (random calling from telephone directory).

Regarding overall staff hiring, CCL estimated in their proposal, the need for 70 telephone stations and the need to hire 1.5 times the number of stations to be manned, or approximately 95-100 persons. Staff would be trained in groups of 20-25 which, coupled with a single supervisor training session for the required 18-20 supervisors, indicated a need for five full training sessions.

The CCL proposal suggested that considerable emphasis was placed on hiring motivated, highly capable staff. CCL also suggested that their location provided good access to a suburban labour pool, particularly Seneca College students. Supervisors were to be drawn from CCL's existing interviewing staff. In general, the overall approach, which called for an intensive co-operative training program by TATPDCSC and CCL, development and use of a comprehensive interviewer training manual and emphasis on selection of qualified staff generated confidence in a successful survey. Members of the TATPDCSC had expressed concerns that rates of pay ($5.50 per hour for interviewers) were low and might inhibit the hiring and retention of high quality staff; CCL convinced the TATPDCSC that the rates were competitive within the industry and that, because of their "especially convenient suburban location, part-time labour is easily attracted without having to resort to premium rates of pay".

The TATPDCSC asked CCL to suggest potential cost savings. Among other steps, the TATPDCSC agreed to reduce the $13,400.00 incentive program for employees by $12,000.00. In discussing this measure with CCL it was concluded that the incentive plan would not be critical to retaining staff. As the survey proceeded, however, it was found necessary to restore the $12,000 as incentive pay for employees.

The first training session was held in the last week of August, 1986, for 19 supervisors. Based on that experience, a number of revisions were made to both the training procedure, the training document and the interview script. TATPDCSC personnel prepared twelve sets of sample responses for simulated interviews ranging in degree of complexity and an overall framework was developed for the three training sessions:

Night 1. - Overview presentation of general information by CCL, general overview of training manual and question and answer period by TATPDCSC members.

Night 2. - Simulated interviews in groups of three with supervisors and TATPDCSC members acting as "respondents";

Night 3. - Live interviews, with monitoring by supervisors.

It quickly became apparent that the number of interviewers that needed to be trained had been underestimated. Due to high staff turnover and low participation rates (i.e. interviewers worked only one or two evenings per week instead of three or four) it became necessary to train many more interviewers than expected. Training became a permanent feature of the TTS. Rather than five training sessions, there were 26; 390 interviewers started training, compared with the original estimate of approximately 100. In order to minimize costs and the demands on TATPDCSC staff time, part way through the survey the training sessions were reduced to two nights, on the understanding that CCL would distribute training manuals for review prior to the first night of training.

2.7 Publicity and Public Relations

The objective of the Publicity and Public Relations Program was to enhance the public response to the survey through publicity and public relations measures. The activities included compiling and putting out press releases, arranging press conferences, establishing procedures for public enquiries, designing material which would be going to the public and miscellaneous other activities.

The Program was designed and implemented by the Public Affairs Office of the TTC with assistance from public relations staff from the Hamilton Street Railway and the Ministry of Transportation and Communications. P. R. Lamont Advertising Ltd. was retained to carry out specialized assignments on behalf of the Team.

One of the initial tasks was to select a name and logo for the Survey. Several alternative names and logos were developed. The TATPDCSC selected "Transportation Tomorrow Survey" together with the logo shown on the letterhead in Exhibit 2.4. The Transportation Tomorrow Survey (TTS) was used consistently in all material related to the survey.

The survey procedure included provision for mailing out a personally addressed letter signed jointly by the Minister of Transportation and Communications and the Regional/Metro Chairman in advance of telephone contact. The advance letter which was developed for the Pilot Survey and rewritten by technical staff for the main survey, was forwarded to the Publicity and Public

Relations Team for review. With the assistance of P. R. Lamont Advertising Ltd., the style of the letter was revised significantly with a view to improving comprehension and the level of interest. The final letter is shown in Exhibit 2.4.

Plans were initiated for a series of press conferences in each Regional Municipality during the week before the start of the Survey. Beginning with Hamilton-Wentworth and ending with Metropolitan Toronto, a press conference was arranged for each Regional Headquarters for the local media with the local Regional Chairman being the key spokesman. Also participating in the press conference was the General Manager of the Survey and a Regional Transportation Planning Official. In the case of the Metro press conference, the Minister of Transportation and Communications also attended. Table 2.8 shows the schedule of the press conferences which were held during the week and a typical program/agenda for these sessions is shown in Exhibit 2.6. Prepared text and graphic material was produced by the TTC Public Affairs Office.

Special information packages were assembled and distributed to all local officials, including all Chiefs of Police, all Regional and Local Councillors, all Chief Administrative Officers, Clerks, Information Officers, Engineers, Planners, and Traffic Officials, all M.P.P.'s, all M.P.'s and all transit agencies. The TTC Public Affairs Office prepared the packages and forwarded the required number to a designated person at each Region for distribution within that Region.

TABLE 2.8

SCHEDULE OF PRESS CONFERENCES

HAMILTON-WENTWORTH Monday, September 8 10:00 AM	The Regional Municipality of Hamilton-Wentworth Hamilton City Hall Council Chambers 71 Main Street West Hamilton, Ontario	Contact: Ted Gill Manager Project Planning Transp. Dept. 526-4339
HALTON Monday, September 8 2:00 PM	The Regional Municipality of Halton Regional Adminis. Bldg. Council Chambers 1151 Bronte Road Oakville, Ontario	Contact: Ho Wong Manager Policy Division Planning & Development 827-2151
YORK Tuesday, September 9 10:00 AM	The Regional Municipality of York Adminis. Bldg. Council Chambers 62 Bayview Avenue Newmarket, Ontario	Contact: John Barnes Transportation Planner 884-1611
TORONTO Tuesday, September 9 1:00 PM	The Municipality of Metropolitan Toronto New City Hall Committee Room #2 Toronto, Ontario	Contact: Dave C. Ferguson Transp. Division Planning Dept. 392-8115
DURHAM Wednesday, September 10 2:00 PM	The Regional Municipality of Durham Council Chambers 605 Rossland Road East Whitby, Ontario	Contact: Jeff Mark Senior Planner Planning Dept. 668-7731
PEEL Friday, September 12 2:00 PM	The Regional Municipality of Peel Peel Regional Offices Councillors' Lounge 10 Peel Centre Drive Brampton, Ontario	Contact: Doug Thwaites Director of Transp. Policy 791-9400 Ext. 351

Exhibit 2.6

TYPICAL PRESS CONFERENCE AGENDA

Schedule of Events for the Transportation Tomorrow Survey

News Conference

Municipality of Metropolitan Toronto
Tuesday, September 9, 1986
1:00 PM
City Hall
Committee Room #2

1:00 PM	News Conference begins	
	Welcoming Statement	Chairman C. Dennis Flynn
	Introduction of Head Table	Chairman C. Dennis Flynn
	Mr. Toivo Rukholm, General Manager Transportation Tomorrow Survey Honourable Ed Fulton, Minister of Transportation and Communications	
1:02 PM	Presentation on Survey	Toivo Rukholm
1:07 PM	Remarks	Chairman C. Dennis Flynn
1:10 PM	Remarks	Honourable Ed Fulton
1:15 PM	Questions	
1:30 PM	New Conference Ends	

Arrangements were made to have telephone numbers and names for people to call with questions and complaints. The Ministry's Public and Safety Information Branch agreed to handle calls during office hours (8:30 a.m. to 4:30 p.m.) and this information together with a toll-free number was provided in the advance letter (see Exhibit 2.4). Subsequently, arrangements were also made to accommodate such calls after office hours. Since TATPDCSC coding staff were working during evening hours a toll-free line was put in their work area and they dealt with public enquiries (as well as the callbacks resulting from messages left on answering machines and miscellaneous other callbacks).

3. TELEPHONE INTERVIEWING

3.1 Final Preparations for Field Work

The final preparations for the telephone interviewing began in early August, 1986. The Chief Supervisor assumed his position at the beginning of August. Telephone interviewing supervisors were recruited from among the contractor's experienced personnel and underwent training August 26 - 28.

The field operations were to be conducted from Toronto and Hamilton. The contractor required additional space within his building near Victoria Park Avenue and Sheppard Avenue East to accommodate sixty telephones for the Toronto operation; from this base the coverage included Metropolitan Toronto and the Regional Municipalities of Durham, York and Peel. Arrangements were made to allow the Hamilton operation to use Transportation Department offices in Hamilton City Hall where twelve telephones were available; the Regional Municipality of Halton was called from this base, in addition to all areas of Hamilton-Wentworth. It should be noted that some Hamilton-Wentworth and Halton calls were also made from Toronto, particularly near the end of the survey period, and throughout the survey period in the case of callbacks for clarification purposes and for interviews in special languages.

The Toronto operation contained an office for the Chief Supervisor and his Assistant with the rest of the area divided into five rooms or work areas, with twelve telephones in each work area.

Each work area contained a desk for a supervisor and places for ten interviewers with push button telephones, and a table for an assistant supervisor/monitor with a telephone which could be used to monitor or "listen in" on the ten interviewers. The contractor's regular telephone room containing twenty telephone lines was located adjacent to the area dedicated to the Transportation Tomorrow Survey; some or all of these lines were dedicated to TTS calls on occasion.

In Hamilton, the Transportation Department office area was used by the contractor during non-office hours. Ten telephones were available for interviewers and the secretary/receptionist's telephone was modified to permit monitoring by the supervisor or the assistant supervisor/ monitor. The Hamilton office also included a data entry person with a special computer terminal who entered completed interviews directly to the computer in the contractor's offices in Toronto via a Bell data communications line.

The telephones were installed and operating in the Toronto work areas by the end of August. The modifications to the telephone system in Hamilton were completed by September 10. Interviewers were recruited during the last part of August and early September with training being conducted September 3 - 14.

3.2 Description of Field Operations

Telephone interviewing began on the evening of September 16, 1986, and continued through the evening of December 13, 1986[1]. Interviewing was conducted between the hours of 5:00 p.m. and 9:45 p.m. Monday to Friday, and between the hours of 10:00 a.m. and 5:00 p.m. on Saturdays.

Personally addressed advance letters were mailed out beginning September 8, 1986. The letters were produced by laser printer with the names and addresses being read directly from the tape containing the sample provided by Bell Canada Marketing Research. The printing of the letters and regular mailings were carried out by a professional printing firm retained by the contractor (CCL) to provide this service. Due to the variation in postal delivery times it was found necessary to mail the advance letter up to two weeks before the expected interview date to ensure that households received the letter before being telephoned.

The Chief Supervisor together with his Assistant was responsible for the daily operation of the interviewing. He attempted to schedule supervisors and interviewers to meet the production requirements and was responsible for daily output, assigning workload and priorities, maintaining discipline, resolving day to day problems and keeping records.

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[1] **Interviewing was also conducted from February 16th to February 20th, 1987, to supplement the sample within the 705 and 519 calling areas.**

The Supervisors assigned work to their interviewers, checked completed interviews for completeness and consistency, monitored interviews in progress and compiled daily statistics for the Chief Supervisor. The Monitors/Assistant Supervisors generally helped the Supervisors with primary responsibility for monitoring interviews in progress and checking the monitored interviews against the forms as completed by the interviewer.

In addition to the monitoring by contractor's staff (i.e. supervisors, monitors and others), the client group also observed and listened to the interviewing. All of the client agency representatives on the Survey Work Group, as well as other senior agency staff on the TATPDCSC, participated in a scheduled program of monitoring the telephone interviewing. Agency staff from Hamilton-Wentworth and Halton monitored the interviewing in Hamilton, while the other staff covered the Toronto operation. These client monitors recorded their observations on the form shown in Exhibit 3.1 and passed on their comments to the Chief Supervisor, or if immediate action was warranted, to the Supervisor of the group. The client monitoring allowed agency staff to gain a better appreciation of the quality of the data, and early detection of a number of problems. An unexplained rise in respondent refusal rates during the ninth week of the Survey, which was detected by client monitoring, was traced to a problem with the mailing of advance letters.

Sample households were assigned in a random fashion to individual interviewers to prevent any

Exhibit 3.1

CLIENT MONITORING FORM

Group Supervisor: ____________________

Date: ____________________

Completed by: ____________________

Interviewer	Considerations							Comments
	Courtesy	Completeness	Probing for Trips	Pace (Speed)	Adherence to intent of script	Persistence re. refusals, don't knows, etc.	General Knowledge	Specific comments and examples of strengths and weaknesses. Notes on other factors which are not included on left (e.g. tendency to lead respondent, etc.)

A = Very Good B = Satisfactory C = Unsatisfactory N/A = Not applicable systematic variation in the quality of the interviews. Five attempts were made to contact each household with busy signals not counting as an attempt. If there was no answer after seven rings, it was recorded as an attempt; the next attempt could not be made for at least two and one half hours. Answering machines were treated as per Section 2.4.1. The status of each sample household was recorded on the coding form after each attempt (see Exhibit 2.3 for the format for recording interview status).

The travel day for the household, in most cases, was the day before the telephone call. However, there were some situations where the "day before" rule did not apply. From the beginning, Monday night calls, as well as Saturday calls, asked for trips made on Friday. When it was noted that Thursday travel days were under-represented because of the difficulty in finding people at home on Friday evenings, a portion of the Saturday interviews were assigned to ask for trips made on the preceding Thursday. The "day before" rule also did not apply when an interview was being conducted to finish a partially completed survey from an earlier date; in this case the original travel day continued to be the day of interest.

3.3 Performance Statistics

A total of 61,708 households were successfully interviewed during the Survey. Table 3.1, Completions by Survey Trip Day, shows the number of interviews completed for each trip day from Monday, September 15, 1986, to Thursday, December 11, 1986. Also shown are the small number of

TABLE 3.1 COMPLETIONS BY SURVEY TRIP DAY

Week No.	Week Beginning	Monday	Tuesday	Wednesday	Thursday	Friday	Total
1	September 15,1986	704	483	594	464	1495	3740
2	September 22	725	527	885	571	1627	4335
3	September 29	771	808	1107	1119	1419	5224
4	October 6	758	898	1049	1099	536	4340
5	October 13	Thanksgiving	1098	1139	1298	1170	4705
6	October 20	975	997	1078	1309	1165	5524
7	October 27	1283	1062	1014	1183	879	5421
8	November 3	960	940	1072	1480	777	5229
9	November 10	1734	75[1]	808	929	1000	4546
10	November 17	988	1188	955	906	939	4976
11	November 24	1074	1096	1201	1559	1021	5951
12	December 1	1139	1084	1078	894	1158	5353
13	December 8	939	720	82	84		1825
Subtotal:		12050	10976	12062	12895	13186	61169
14[2]	February 16, 1987	88	93	88	97	92	458
Other[3]							81
Total:		12138	11069	12150	12992	13278	61708

[1] Rememberance Day

[2] Special supplementary sample in 705 and 519 calling areas

[3] An additional 81 interviews have no assigned trip day.

supplementary interviews completed for the week of February 16, 1987, with households in the 519 and 705 calling areas which had been omitted in the original sample. It should be noted that no interviewing was done for trips on Thanksgiving Day (October 13) and only 75 interviews were completed for Rememberance Day (November 11).

This Table shows the distribution of the completed interviews by day of the week and by month. The completions on each weekday are within 11% of the 12,000 target level; all days except Tuesday (11,069) are over the targeted number. The distribution by week over the time span of the survey is relatively uniform with approximately five thousand interviews completed each week.

Table 3.2 shows the major statistics related to the use of the sample. Contact was attempted by telephone with a total of 102,606 households. Almost seven thousand (6,738) telephone numbers were found to be "not in service". This reflects the fact that the sample was based on the June, 1986, billing records and this data base was becoming increasingly out of date as the survey proceeded. Over ten thousand households (10,976), or 10.7% of all households called, could not be contacted even after five attempts spread out over three or more days. Slightly over one thousand (1,128) calls reached ineligible respondents - either business establishments (598) or households located outside the region which they were supposed to represent (530). A small number of households (358) could not be interviewed because they did not speak a survey language (neither English nor one of the other nine survey languages).

Table 3.2 Sample Usage

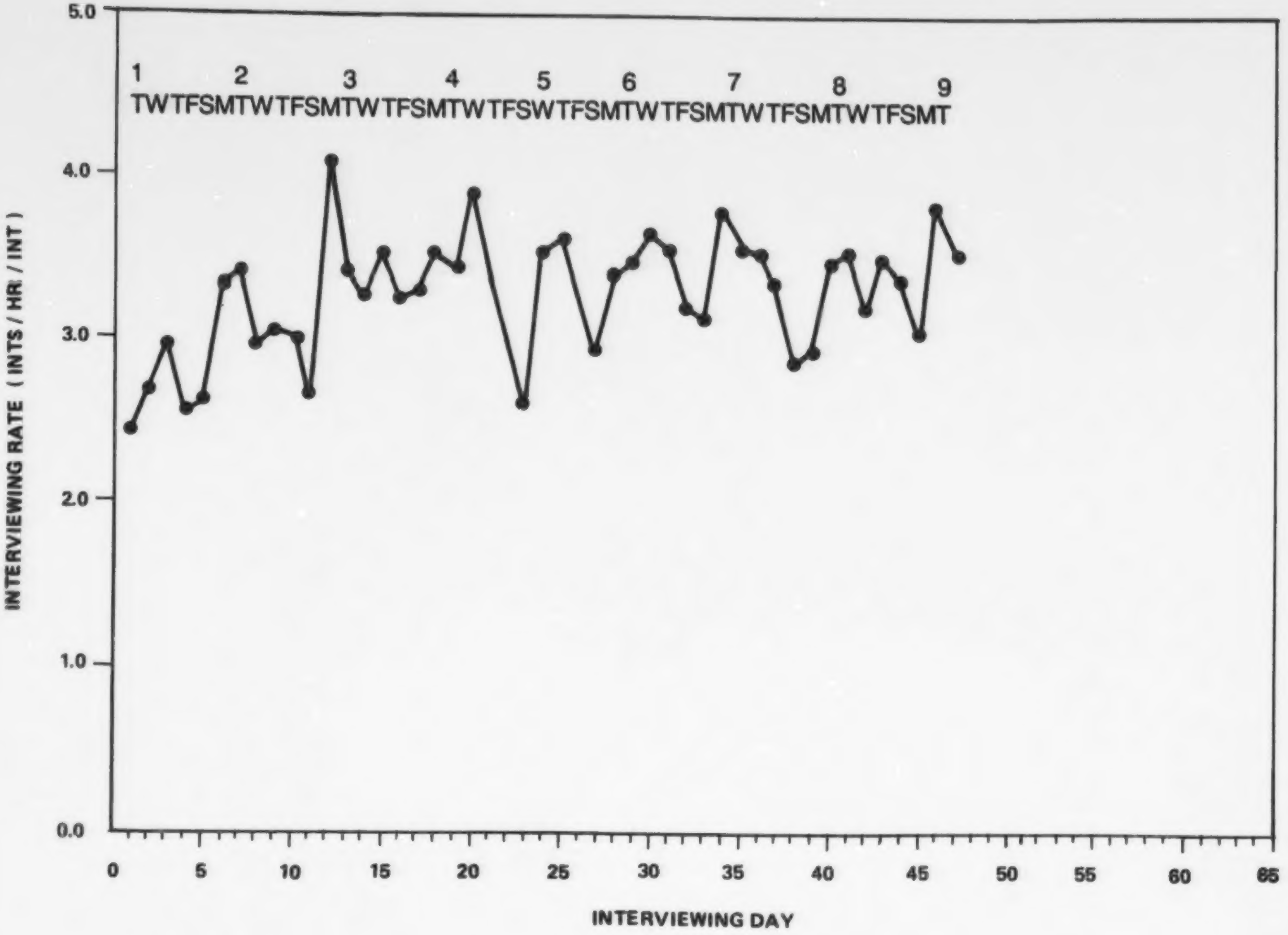
Completed Interviews	61,708	(1)
Language Barrier	358	(2)
Refusals	21,698	(3)
Total Eligible Contacts (1)+(2)+(3)	83,764	(4)
Not eligible	1,128	(5)
Not in service	6,738	(6)
No answer after 5 attempts	10,976	(7)
Total Sample Used (4)+(5)+(6)+(7)	102,606	(8)
Refusal Rate (3)/(4)	25.9%	
Response Rate (1)/(4)	73.7%	
Completion Rate (1)/(8)	60.1%	

The number of refusals totalled 21,698 households, or 25.9% of all the eligible households which were contacted. This compares unfavourably with the 8% refusal rate experienced in Montreal in 1982, the 14% refusal rate documented in the 1979 Metro Travel Survey and the 15% refusal rate encountered during the Pilot Survey. However, it is very similar to the 25% refusal rate encountered in Vancouver during a similar survey in 1985.

Interviewer productivity is measured in terms of completed interviews per hour of interviewing time. This is an overall productivity rate and takes into account all interviewer time, including breaks and time for administrative tasks. Exhibit 3.2 shows the fluctuation in this measure of productivity on a daily basis from the beginning of the survey September 15, 1986, until November 11th, during the ninth week of the survey. It is evident from Exhibit 3.2 that productivity was significantly lower on Saturdays - the lowest points on the chart are invariably Saturdays. It was expected that it would be more difficult to make telephone contact on Saturdays due to shopping and weekend travel. It is also evident that there was an initial learning period lasting approximately two weeks, during which the productivity rate was on an upward trend. After the first two weeks, while the rates fluctuated around the average, there was no discernible upward or downward trend. The average productivity rate stabilized at approximately 3.5 completed interviews per interviewer hour. By way of comparison, the Vancouver survey in 1985 achieved close to 4.5 completed interviews per interviewer hour, while

Exhibit 3.2

INTERVIEWER PRODUCTIVITY



the Montreal survey in 1982 achieved over six interviews per interviewer hour. There is no apparent fundamental difference between the three Metropolitan areas, or the design of the three surveys, which would account for the large difference in interviewer productivity. Differences in questionnaire detail and computation do account for some of the variation. Also, in Montreal, there are significantly fewer trip makers.

Exhibit 3.3 shows in graph form the number of completed interviews per attempt. Slightly more than half (50.7%) of the total completions were achieved on the first call, while three quarters (75.9%) were completed after two calls. The fifth call was responsible for about five per cent (5.6%) of the completions.

Table 3.3 shows the sample distribution by Regional Municipality within the Greater Toronto Area. The Table includes the known distribution of households, the distribution of the completed interviews and the final sample size achieved in each Region. The distribution of completed interviews among the Regions is very close to their share of the Study Area households; only Metropolitan Toronto displays a noteworthy variation in the distribution of the completed interviews. Metropolitan Toronto contains 57.0% of the households within the Greater Toronto Area, while only 55.8% of the total completed interviews were from Metropolitan Toronto; the final sample size in Metropolitan Toronto was 4.0% compared to the Study Area average of 4.1%. On the other hand, 7.5% of the interviews were completed in the Regional Municipality of York, which contains only 6.7% of the households,

Exhibit 3.3

PROPORTION OF INTERVIEWS COMPLETED AFTER EACH ATTEMPT

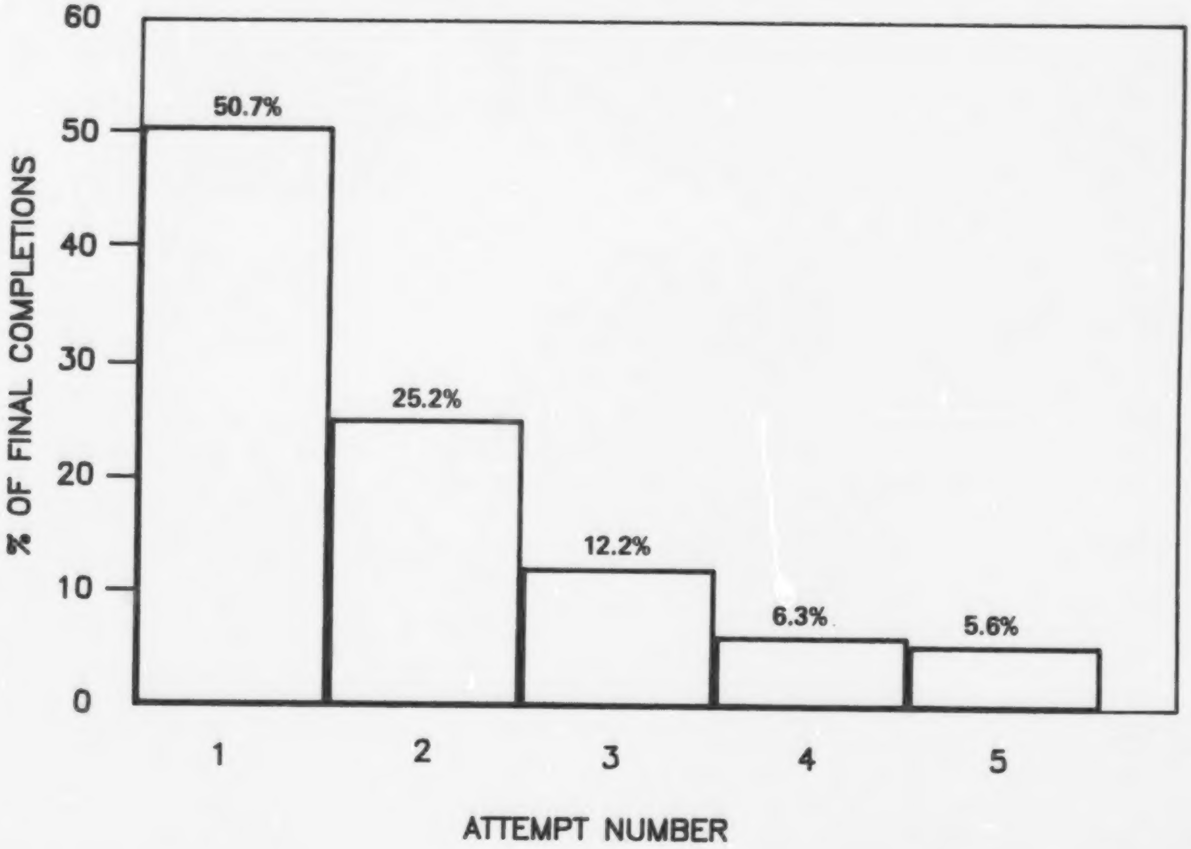


Table 3.3 Sample Distribution by Region

Region	Distribution of Households		Distribution of Completions		Final Sample Size
	Number	%	Number	%	%
Metropolitan Toronto	853,500	57.0	34,398	55.8	4.0
Peel	184,200	12.3	7,661	12.4	4.2
Hamilton-Wentworth	161,700	10.8	6,549	10.6	4.1
York	100,300	6.7	4,628	7.5	4.6
Durham	107,800	7.2	4,388	7.1	4.1
Halton	89,800	6.0	4,050	6.6	4.5
Total:	1,497,300	100.0	61,674[1]	100.0	4.1

[1] **Thirty-four interviews were from households external to the study area or unassigned.**

resulting in a 4.6% sample within York. A high response rate in Halton resulted in a 4.5% sample.

4. DATA ENTRY, CODING AND EDITING

This chapter outlines the processes related to data entry, coding and editing of the TTS data. The functions and tasks discussed in this chapter are illustrated in Exhibit 4.1.

4.1 Data Entry

The information collected by the telephone interviewers was manually recorded on coding forms (Exhibit 2.3). Next, data entry operators entered the data using the DASH-1[1] data entry system on a Data General MV4000 minicomputer.

The DASH-1 software is designed to allow data to be edited as it is entered. Mandatory fields are designated and range checks and logic checks can be programmed into the system. For example, only legitimate codes could be entered for trip purpose or travel mode. Originally all editing was performed on-line, but the procedure proved cumbersome and slow so the range checks were separated from the logic checks. The range checks were performed on-line at the data entry stage; the logic checks were done in batch mode following data entry.

Error reports were produced and the corrected survey records were re-entered. Corrections which could not be deduced from the original survey form were checked with field staff, if necessary, or sent back to the interviewer for a callback if required.

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[1] **The DASH-1 system is a proprietary data entry software package developed by Microways.**

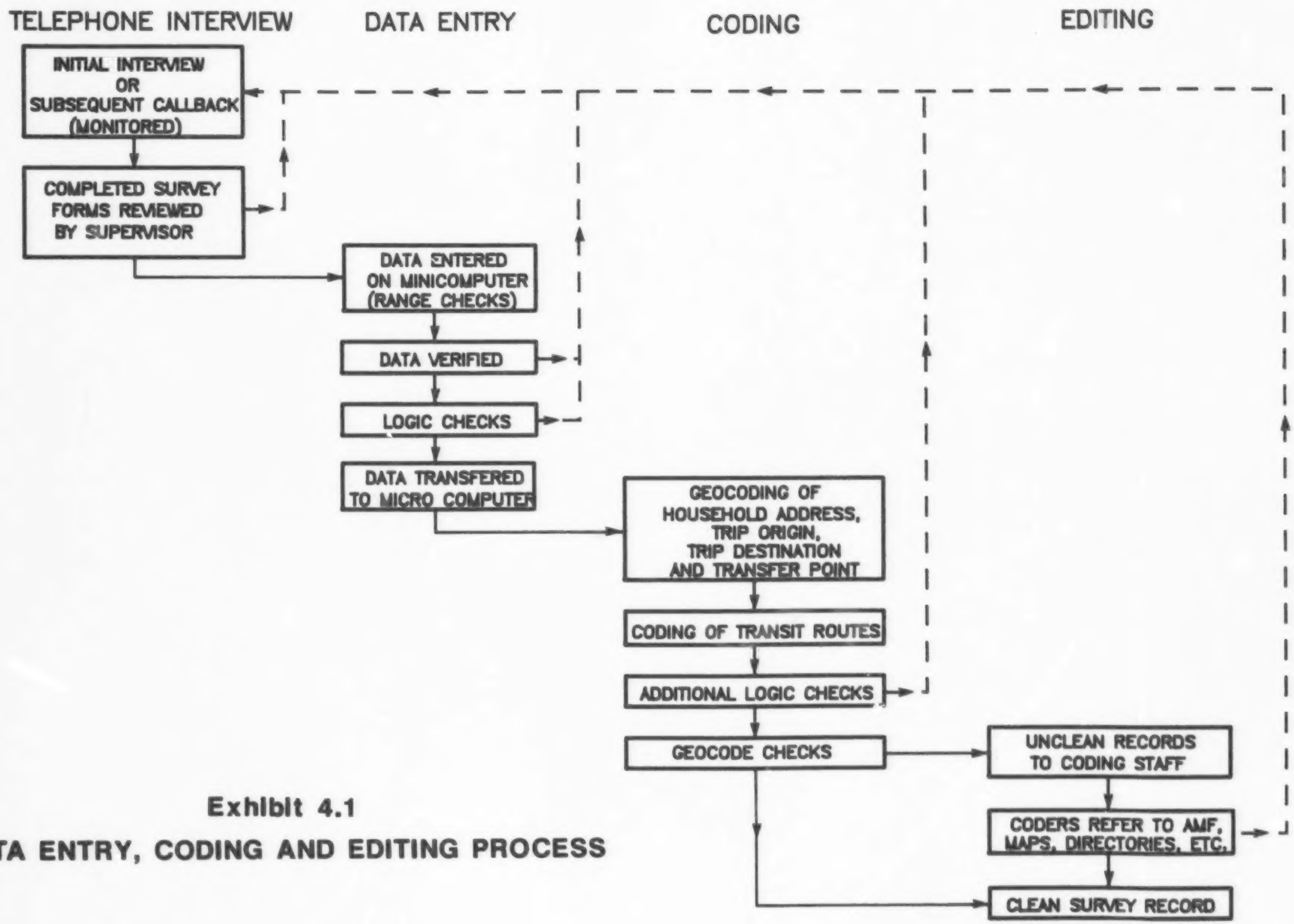
TELEPHONE INTERVIEW
DATA ENTRY
CODING
EDITING
INITIAL INTERVIEW OR SUBSEQUENT CALLBACK (MONITORED)
COMPLETED SURVEY FORMS REVIEWED BY SUPERVISOR
DATA ENTERED ON MINICOMPUTER (RANGE CHECKS)
DATA VERIFIED
LOGIC CHECKS
DATA TRANSFERED TO MICRO COMPUTER
GEOCODING OF HOUSEHOLD ADDRESS, TRIP ORIGIN, TRIP DESTINATION AND TRANSFER POINT
CODING OF TRANSIT ROUTES
ADDITIONAL LOGIC CHECKS
GEOCODE CHECKS
UNCLEAN RECORDS TO CODING STAFF
CODERS REFER TO AMF, MAPS, DIRECTORIES, ETC.
CLEAN SURVEY RECORD

Exhibit 4.1

DATA ENTRY, CODING AND EDITING PROCESS

From the MV4000, the data was transferred to a Convergent Technologies NGEN microcomputer where geocoding of trip origins and destinations was performed together with transit route coding. The Convergent Technologies NGEN system was used because it provided the necessary multi-user capability and because a preliminary version of the geocoding software had earlier been developed on Convergent Technologies hardware owned by the Ontario Ministry of Transportation and Communications.

4.1.1 Verification.

Based on the extensive range and logic checking capabilities of the DASH-1 system, it was decided that verification of 10% of the survey forms would provide sufficient control on the quality of the data entry.

When it became apparent that the DASH-1 system could not handle all the required range checks and logic checks during the data entry, the verification procedure was revised to the following:

1. Each operator entered eight questionnaires, then checked all address fields (home address + trips) and corrected any errors found. The bundle of eight was then taken to a verifier.

2. The verifier picked one form at random and verified the data. If zero errors were found, the bundle was accepted.

If one error was found, the verifier selected another questionnaire from the bundle of eight and verified the data. If no further errors were found the bundle was returned to the original data entry operator. If more than one error was found in the first or second questionnaire the entire bundle was returned to the operator who checked all eight forms again. The process was then repeated until the bundle was felt to be satisfactory.

This process provided a method where the data was verified and the data entry operator causing specific problems was identified. The operators were coached or retrained to eliminate the source of identified problems.

4.2 Coding

4.2.1 Geocoding

Geographical referencing or "geocoding" was used to record the locations of trip origins and destinations with X and Y coordinates to the blockface level of detail. Subsequently, the data can be aggregated to any alternative zone system simply by defining the coordinates of the zone boundaries.

Each origin and destination location description was either a numbered street address (usually the home address), an intersection or a place identified by its name (referred to as a monument). These locations were entered into the computer in fixed field formats which varied depending on the type of location description specified. The records then passed through the geocoding programs which assigned the corresponding geocode for the location specified.

TTS data has been coded to the UTM 6 degree system which is capable of defining longitudinal and latitudinal coordinates to the nearest metre. The coordinates actually used in the TTS give locations of the centre of the nearest blockface. In the case of a residential address, the corresponding blockface would be a point midway between intersections and set back 22 metres from the centreline of the roadway.

The geocoding system used by Statistics Canada was adopted for the Survey. Statistics Canada has built up detailed computer files for many parts of the country linking street addresses to a blockface geocode. These files, known as Area Master Files (AMF's) were available for all of the GTA except for one small area (the Town of Caledon).

The AMF is organized by local municipality. In order to identify a street or monument the correct municipality must be indicated. Ten characters provided sufficient space to allow every local municipality to be uniquely identified. Even with a ten character field the number of misspellings and data entry errors for each municipality was large. For instance, the City of Scarborough had more than one hundred different spelling variations.

In order to solve the problem of respondents referring to addresses in Metropolitan Toronto as being in the City of Toronto, alias records were created in Toronto for all streets located in Etobicoke, North York, York, Scarborough and East York. These alias records referred to the real streets in the appropriate municipalities.

4.2.2 Monuments

Many monument names uniquely identify a particular location such as "CN TOWER" while others describe several possible locations. In order to determine the exact location of a monument such as "McDonalds Restaurant" a description is required. For example "McDonalds at Jane and Wilson" identifies a unique McDonalds.

The original AMF contained about 300 monuments. In addition the Regional Municipalities identified about 3,000 monuments. The information provided included the monument name, type, municipality and street address. Location coordinates were assigned to monuments by looking up the street address in the AMF for monuments identified before and during the survey.

4.2.3 Alias Files

Alias files were created to eliminate the need to look up an address more than once. For example, when a monument was spelled correctly but in a version different from the original record on file (CN Tower versus C. N. Tower) the correction process was simplified because all that was required was to reference the alias record to the real record. When a street name or a monument was misspelled it could be corrected by either correcting the original record or by creating an alias record and referencing the misspelled version of the street name to the correct spelling of the street. Future similar misspellings of the same street were automatically corrected by the geocoding software.

4.2.4 Transit Route Coding

Transit trips were identified by the operating agency of the vehicle (e.g. Markham Transit) and a description of the route that was used by the respondent (e.g. Yonge Subway). In most instances, transit route number codes were not recorded by the interviewers. Some respondents referred to transit routes by route number and if that was the only information offered, the code was recorded. For the remainder, route description look-up files were created and the computer software was designed to automatically assign the correct route number code.

To allow for the different methods that respondents used to describe transit routes, an alias route description was automatically created each time an exact match was not found.

This policy of free-field data recording was adopted because interviews were conducted in a conversational form rather than a rigidly structured form. Interviewers were instructed to not interrupt the flow of an interview to make an entry which would satisfy the computer. Corrections were to be made at the end of the interview.

4.3 Editing

Mistakes or insufficient data resulted from:

1. respondents providing incorrect or incomplete information;
2. interviewers misspelling entries on the interview form;
3. interviewers completing interviews with gaps or omissions in the recorded information; and supervisors failing to catch the omissions;
4. typographical mistakes by data entry operators;
5. deficiencies in the various look-up files in the geocoding system.

4.3.1 Geocoding Errors

The types of errors detected during the geocoding process included the following:

a) Municipality name not found in the AMF.

The first step in any location lookup was to look up the municipality number. The municipality number was required to access all of the other types of records.

b) Street name or intersection not found in the Area Master File.

Initially the software attempted to find all street header records that matched the specified municipality number, street name, street type (e.g. street, avenue, etc.) and direction (i.e. East, West, etc.). If no records were found then the lookup was attempted once more, this time with the street type dropped from the selection criteria. If no street header records could be found that matched any of the above criteria, then an alias record was added to the system (see Section 4.2.3), an error message was returned and the lookup was considered to be a failure.

When performing an intersection lookup, the program attempted to look up the municipality number, followed by both of the street name records. If any of these could not be looked up then an error message was printed and the lookup was aborted.

c) Monument name does not exist in the AMF.

If a monument lookup was unsuccessful, an error message was generated and an alias record was created for that monument.

d) Address falls below or above existing street number ranges.

Detection of the above problems necessitated reference to the AMF to determine the cause of the problem for correction.

Software was produced to allow easy access to the AMF in a menu driven environment. The menu offered twelve options. Each option in turn led to a number of prompts which allowed examination of the AMF. Besides displaying X and Y coordinates of addresses, intersections and monuments there was an option to list all streets intersecting with a given street in a given municipality. Another option provided a list of monuments from incomplete information. For instance, by entering the municipality and the first few characters, the software generated all monuments in that municipality that start with those letters. Another option was used to study the address ranges and the corresponding coordinates for any given street by entering the street name and municipality.

After a problem was solved, additional software was available to access either the AMF for maintenance or the individual problem record, to make the necessary correction.

4.3.2 Transit Errors

Errors in the public transit route information were grouped according to the following categories:

a) Route name not found in transit file.

The first time that a route description which was not part of the original lookup file was processed, the computer simply flagged it as an invalid route. The route description was automatically added to the lookup file as an alias route description. Common misspellings such as the "Eglington" East Bus route or the "Young" Subway fell into this category.

b) Route name matched to an alias with no route number code.

When a route description was processed that had previously been added to the lookup file but had not yet been assigned a route number code, the computer software altered the previous message to indicate that a matching alias route description existed in the lookup file but had not yet been assigned a route number code. In certain instances of misspelled route descriptions, the coder assigned the correct route number code. Subsequently, all route descriptions that matched this alias exactly would be processed automatically.

In other instances, the alias route descriptions were not sufficient to allow a route number code to be assigned. For example, the alias route description FINCH is not complete. The coder would refer to the interview form and determine whether the respondent was referring to the 39-FINCH EAST bus route or the 36-FINCH WEST bus route. The record in question would subsequently be edited.

c) Transfer between routes which do not meet.

When more than one transit route was used on a trip, the computer software automatically referred to another look-up file and checked whether or not the various routes intersected with each other. This file of intersecting routes was created prior to commencement of the survey. If a trip record contained an error in this class, the coder would first determine from appropriate reference material that the routes in question do or do not connect. If the connection was valid, the lookup file was updated.

4.4 Summary Statistics

The Survey respondents reported their trip ends by the following categories:

Type	Per Cent of Total
Home Addresses	44%
Detailed Street Addresses for non-home locations	8%
Monuments	30%
Intersections	18%

Setting aside the home addresses, it is worth noting that over half (53%) of the trip ends were reported as monuments, compared to almost one third (32%) as intersections and a small proportion (15%) as detailed street addresses.

The success of the computerized geocoding technique varied by type of lookup as illustrated in the table below:

Type	Success Rate
Home Addresses	76%
Monuments	37%
Intersections	60%
Non-Home Addresses	45%

The success rate for home addresses was not higher because of a high rate of data entry errors and because the descriptions were mailing addresses which are not always sufficient for geocoding, particularly in the case of rural routes or postal boxes.

The monument file was continually added to throughout the survey. Initially the success rate was only around 10% because of the inadequacy of the initial monument files, but by the end of October it improved and levelled off at almost 40%. Thereafter the look-ups were mainly affected by the large number of spelling errors entered by both interviewers and data entry operators.

The software was designed to allow alias names to be entered into the AMF; however, the statistics discussed here relate to first attempts at returning coordinates. Other factors which affect the statistics include the following:

(i) Trip ends outside the GTA and in Caledon were not included in the AMF.

(ii) the AMF itself contains errors, omissions, etc.,

(iii) the AMF's were one to five years old; therefore, new subdivisions and other new development would not be included.

The automatic creation of alias street names in the AMF resulted in a 20% improvement in the lookup rate for intersections (from about 40% to about 60%) and non-home addresses (from around 20% to around 40%) by the end of the survey period.

Transit route number codes were also automatically assigned. At the beginning of the survey, when coders were not fully aware of all unique routes in the GTA, the success rate was low, but by the end of the survey it improved to over 60%. Besides spelling errors in the route descriptions, the system had to deal with different nomenclature for the same route. For example, the Bay Trolley Coach route was described in almost 50 different ways (Bay Trolley Car, Bay Trolley, Bay-6, Bay Street route, Bay Bus, etc.).

As mentioned earlier, a file that described routes which intersect with each other was maintained throughout the survey so that checks were performed automatically. The success rate here also improved from approximately 50% early in the survey to better than 80% by the end.

5. SURVEY COSTS

5.1 Pilot Survey Costs

The Pilot Survey was funded by the MTC and carried out by a contractor for a total fee of $37,000. Almost 1500 households were interviewed during the nine day survey at an average cost of approximately $25 per household. The objectives of the Pilot Survey were to test various survey design features, not to maximize productivity. The survey had high "up front" costs and management overhead costs (including the need for extensive documentation), resulting in the $25 figure.

5.2 Survey Budget

During the preliminary planning for the survey, it was estimated that approximately $600,000 to $800,000 (in addition to in-house staff and services) would be required to carry out the work which was envisaged. In the early discussions it was uncertain whether the Ministry of Transportation and Communications would fund 50% or 75% of the total cost. There was a consensus, however, on the cost sharing arrangement between the participating upper tier municipal governments - costs would be proportioned according to population. Within Metropolitan Toronto there was a further agreement between the Metro Planning Department and the Toronto Transit Commission to share Metro's levy evenly.

Agency	Cost-Sharing Percentage
Durham	1.94
Halton	1.64
Hamilton-Wentworth	2.60
Metropolitan Toronto	6.66
Ministry of Transportation and Communications	75.00
Peel	3.50
Toronto Transit Commission	6.66
York	2.00
	100.00

The range of potential costs formed the basis of the 1986 budget requests submitted by the participating agencies to their respective Councils and Commission. Subsequently the Ministry advised that it was prepared to fund 75% of the cost to a maximum total cost of $800,000. Most of the agencies had already received budget approval for sufficient funds to cover at least 25% of their share of the $800,000. As a result, $800,000 became the level of funding which was considered to be available during 1986 for the survey, and all subsequent detailed planning was undertaken within that framework.

Based on data available from similar surveys in Montreal and Vancouver, and on the experience of some of the participating agencies in the Toronto area, detailed budget estimates were prepared for a wide range of alternative assumptions, particularly with respect to sample size and interviewer productivity. With respect to sample size, estimates were prepared for six different levels ranging from 3.5% to 6.0% of households; in the case of interviewer productivity, the analysis included eight different rates, ranging from 2.5 interviews per interviewer per hour to

6.0 interviews per interviewer per hour. Detailed budgets were prepared for 48 different scenarios; furthermore, consideration was given to the cost impact of other important factors dealing with survey methodology (e.g. conventional pencil and paper versus computerized direct data entry methods; and whether the survey would be run from one central location in Toronto, or split between Toronto and Hamilton).

The resulting cost estimates were plotted according to sample size and interviewer rate (on a chart which has interviewing rate as the X-axis and sample size as the Y-axis). Exhibit 5.1 shows the isocost lines which were derived from the plotted cost estimates. Exhibit 5.1 suggests that, for example, a budget of $800,000 would be adequate for a 5% sample if the interviewers are able to conduct 4.9 interviews per hour. Since Montreal and Vancouver achieved 6.0 and 4.5 interviews per hour per interviewer respectively, it was assumed that it would be possible to achieve at least 4.0 interviews per hour per interviewer in Toronto; at this level of productivity, $800,000 should be adequate to produce a sample of at least 4.0%.

Table 5.1 shows the preliminary budget which formed the basis of planning for the field work. It should be noted that it was assumed that in addition to the out-of-pocket costs shown in Table 5.1, the participating agencies would contribute in-house expertise and supplies and services wherever possible, but especially in the area of coding origin and destination data and transit route information.

Exhibit 5.1
BUDGETARY PLANNING ISOCOST LINES

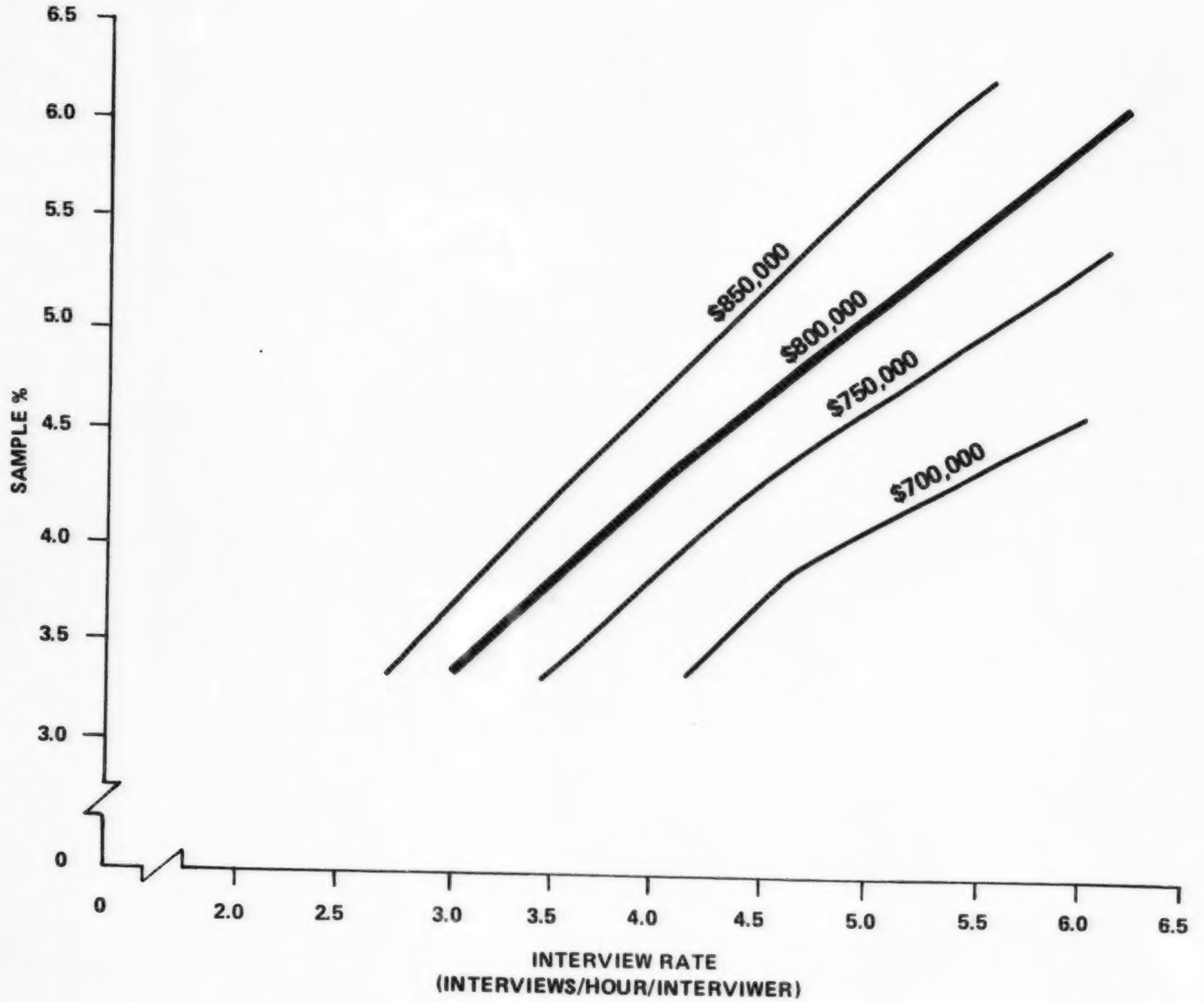

TABLE 5.1

PRELIMINARY BUDGET BY MAJOR ACTIVITY

Activity		Cost
Administration		$135,000
Data Processing		145,000
Interviewing		
Interviewers/Supervisors	$250,000	
Equipment, Supplies, etc.	130,000	380,000
Editing/Coding		40,000
Allowance for Trip Diary		50,000
Sub-Total		750,000
Contingency		50,000
TOTAL[1]		**$800,000**

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[1] **In addition to this cost, it was assumed that the participating agencies would contribute supplies, services, and manpower as needed, especially staff for coding trip origins and destinations and transit route information.**

The budget was refined as the project proceeded (see Table 5.2). The first adjustment was made after the telephone interview contractor had been selected and the contractor costs had been determined. This adjusted budget was very similar to the preliminary budget (Table 5.1), with funds for all tasks falling within the contractor's area of responsibility being consolidated into one large amount ($580,000 including contingency funds). As the magnitude of the geocoding task became evident, the budget was adjusted again by reallocating funds from the Trip Diary Survey and from contingencies to increase the geocoding budget to $110,000.

5.3 Telephone Interview Contractor Costs

The agreement with the telephone interview contractor stipulated a contract cost of $485,000 as shown in Table 5.3. This included a $22,000 contribution towards the geocoding operation. The per household cost of the field work (excluding the geocoding) was budgeted at $7.72. The actual final payments to the contractor totalled over $503,000 for 61,708 completed households; it is estimated that the client agencies contributed approximately $20,000 worth of free supplies and services to the telephone interviewing effort (e.g. envelopes, letterhead, office space in Hamilton and miscellaneous others). If these supplies and services are added to the total, the cost for the field work (excluding all geocoding costs) would be a little over $500,000 ($501,000), or $8.12 per completed household.

TABLE 5.2

ADJUSTED BUDGET BY ACTIVITY

Activity	Budget	
	1st Adjustment[1]	2nd Adjustment[2]
Administration	$88,000	$88,000
Telephone Interviewing Contractor (incl. Contingency)	580,000	527,500
Coding	-	110,000
Software Development	44,000	44,000
Trip Diary Survey	60,000	2,500
Other Costs	28,000	28,000
TOTAL:	**$800,000**	**$800,000**

[1] The first adjustment to the budget was made after the telephone interview contractor had been selected and the contract costs had been determined.

[2] The second adjustment to the budget was made as the geocoding requirements became evident.

TABLE 5.3

TELEPHONE INTERVIEW SURVEY CONTRACTOR COSTS

Activity	Contractor Budget		Actual Cost Including Client Contribution[1]	
	Amount	Unit Cost	Amount	Unit Cost
Interviewing				
Interviewers'/ Supervisors' Wages	$230,000	$3.81		
Equipment, Supplies, etc.	88,000	1.48		
Sub-Total (Interviewing)	318,000	5.29	$346,000	$5.61
Advance Letter	50,000	0.85	60,000	0.97
Data Entry	70,000	1.15	70,000	1.13
Administration	25,000	0.42	25,000	0.41
Total (All but geocoding)	463,000	7.72	501,000	8.12
Contribution to Geocoding	22,000	n/a	n/a	n/a
Grand Total:	$485,000	n/a	n/a	n/a

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[1] **Estimated distribution of contractor costs and the supplies and services provided by client agencies.**

5.4 Geocoding Costs

The total geocoding cost of $301,000 is itemized in Table 5.4. It should be noted that these geocoding costs also include the cost of coding the transit route data. The direct costs of the geocoding operation totalled $220,000, with an additional $22,000 being included in the telephone survey contractor's budget and almost $60,000 being received in the form of manpower and equipment contributions from client agencies.

The cost of the geocoding was approximately 80 cents per trip with the direct cost being close to 60 cents per trip.

5.5 Other Indirect Costs

In addition to the indirect costs noted with respect to geocoding and the telephone interviewing field operations, there were other indirect costs borne by the participating agencies. They included staff time and/or equipment or services provided by the agencies without billing the Survey.

In addition to the staff provided to help with the geocoding, the agencies provided professional and technical staff to carry out special assignments in the planning and implementation of the Survey.

The types of services and/or supplies provided by the agencies included the following:

i) Drafting and graphic design services (TTC and MTC).

TABLE 5.4

GEOCODING COSTS

Activity	Funded By TTS	Contrib's from Agencies	Included in Contractor's Costs	Total
Software Development	$28,000	$10,000	-	$38,000
Hardware Leasing	15,000	2,000	$7,000	24,000
Staff	161,000	47,000	15,000	223,000
Other	16,000	-	-	16,000
TOTAL:	$220,000	$59,000	$22,000	$301,000

Cost per Household	(61,708 households)	$4.88
Cost per Person	(171,904 people)	$1.75
Cost per Trip	(370,919 trips)	$0.81

ii) Publicity and public relations services (TTC and others)
iii) Financial support services (Metro)
(iv) Staff to carry out special research and other assignments (Metro, MTC, TTC, Peel, York, GO)

These are in addition to the contributions such as office space (Hamilton-Wentworth), printing of letterhead (TTC), geocoding software development (MTC) and hardware loans (MTC) which were already accounted for in previous sections.

While it is difficult to attach monetary values to some of the indirect costs, others can be estimated relatively easily. No attempt has been made to attach a dollar value to senior staff time, but professional/technical staff time is estimated to have been worth $15,000-$25,000 to the project. Other indirect costs are estimated to have been worth another $10,000.

5.6 Summary of Costs

Table 5.5 shows a summary of all costs associated with the conduct of the Transportation Tomorrow Survey field surveys, including the Trip Diary Survey in addition to the telephone survey. The total cost of $1,043,000 consists of $992,000 for the telephone survey and $51,000 for the Trip Diary.

At $992,000, the telephone survey cost approximately $16 per completed household ($15 per completed household for direct costs). These costs do not include subsequent costs for processing and analysing the data.

TABLE 5.5

SUMMARY OF ACTUAL COSTS[1]

	Activity	Amount	Cost/Completed Household
1.	Administration	$88,000	$1.43
2.	Pilot survey	37,000	0.60
3.	Telephone Interviews	501,000	8.12
4.	Geocoding	301,000	4.88
5.	Other[2]	65,000	1.05
	Sub-Total:	**992,000**	**16.08**
6.	Trip Diary	51,000	-
TOTAL:		**$1,043,000**	-

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[1] This summarizes all costs, including indirect costs (goods, services and manpower provided by individual agencies) and special funding provided by the Ministry of Transportation and Communications for the Pilot Survey and the Trip Diary Survey.

[2] This category includes direct and indirect costs not associated with the specific activities above (e.g. publicity and public relations).

6. CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions which can be drawn about how the survey was carried out and the recommendations on how to improve the process in subsequent surveys. Some of the conclusions and recommendations must be considered preliminary or tentative because only in-depth analysis of the tabulations of the survey responses will show how well the survey process achieved its goals.

6.1 Telephone Surveys

In general, the telephone interview technique proved itself to be a very cost effective method of collecting household travel information. Costs are very comparable to "mail-out, mail-back" surveys, while respondent response rates are higher. It remains to be seen whether the quality of response (i.e. trip rates reflecting trip recall) is equivalent to the mail-back trip diary method, but indications are that telephone surveys collect at least peak period trips as well as mail-back trip diaries.

6.2 Sample

Bell's telephone listings appears to be a good source for drawing the sample for a travel survey. However, there were problems with the sample drawn for the Transportation Tomorrow Survey due to various reasons. These sorts of problems can be avoided by taking the following action in future:

i) The Survey Work Group should participate directly in the sample draw discussions with Bell; the instructions to Bell and their confirmation should be in writing with all participating agencies receiving a copy of this documentation.

ii) The sample from Bell should include certain summary statistics about the number of records included by municipality, by postal code (or by the first three digits of the postal code) and by any other category which may be of interest.

iii) Sufficient time (e.g. two weeks or more) should be scheduled into the work program for a detailed analysis of the sample by the Survey Work Group and the individual agencies.

6.3 Direct Data Entry

The decision to not risk proceeding with a direct data entry (or CATI) methodology to carry out the Survey in 1986 was almost certainly a very wise move. Several aspects of the proposed system were unproven and the Survey Work Group had legitimate reason for being concerned about introducing too many potential problems into such a large project.

However, it was evident from the Pilot Survey that a direct data entry method was highly desirable, and experience with the 1986 Survey confirmed this. An automated approach would not only eliminate the paper handling and the extra step involving data entry, but would permit almost instantaneous progress reports and calling statistics (e.g. refusal rates).

It is recommended that any future survey give serious consideration to using direct data entry. Furthermore, it is recommended that the direct data entry system consist of a full screen representation of the entire questionnaire with full screen editing capabilities, as opposed to the CATI systems used by market research firms. The CATI approach, a page by page system, is tailored to the highly structured interviews common to marketing research surveys; this approach is unsuited to travel surveys where it is important for the interviewer to get an overall understanding of the household's activity pattern and to probe for trips which the respondent may have forgotten to mention.

6.4 Marketing Research Industry

During the course of the Transportation Tomorrow Survey, the Survey Work Group had extensive exposure to the market research industry. The Work Group reviewed written proposals from numerous firms, visited the premises of several companies, interviewed some of them and worked with three different firms (Pilot Survey, main survey and Trip Diary Survey).

A small number of companies appear to have some excellent staff at the professional and technical level, but this is not an industry norm. Also, due to the highly competitive nature of the industry in vying for the routine marketing surveys which account for much of the industry's income, all firms are highly sensitive to keeping labour costs to an industry minimum. While this results in a lower quality interviewer, it is not critical to the types of surveys conducted by market research firms. There is not a great deal of skill required on the part of the interviewer because the questionnaires tend to be highly structured with respondents giving "yes/no" answers or choosing a response from a multiple choice list.

It is therefore recommended that future surveys not necessarily rely on the market research industry to carry out the field work. Equal consideration should be given to some of the other possibilities described in Section 6.6 below.

6.5 Quality of Telephone Interviewing Staff

The contractor had difficulty attracting enough capable interviewers to staff the 72 telephones. The shortage may have resulted from a number of factors, including an overly optimistic estimate of the labour supply by the contractor and the impact of an upsurge in the Toronto economy which caused service industries to use up the low wage labour pool. Whatever the cause, the shortage affected the quality of the travel data in a number of ways. The shortage of applicants meant that hiring standards were lowered and more marginal interviewers were retained on staff. In particular, there were some interviewers with very poor general knowledge about places and transit services within the survey area, and displayed poor spelling and handwriting. The shortage also meant that supervisors had to resort to pleading with interviewers to come in to work more often. Under the circumstances it was very difficult for supervisors to impose higher quality and/or productivity standards on the interviewing staff. While there were some excellent interviewers and most were at least satisfactory, marginal performers managed to stay on the job because there was nobody better to take their place.

It was apparent that a higher hourly rate was needed to attract more potential interviewers of higher caliber. Since the mark-up on market research company interviewers is typically in the range of 100%, it would cost two dollars to put an extra dollar into the hands of the interviewer. It would be possible to increase the actual hourly pay to interviewers without increasing the cost of the survey if the mark-up is reduced, or if the survey is conducted under a different arrangement with the agencies assuming a greater role in administering and directing the project. Taking on greater responsibility also means assuming a greater risk in the event of complications and over-runs.

When planning future surveys, it is recommended that an interviewer hourly wage rate be established at the outset by the Survey Work Group. This will probably require some research and analysis in the Toronto workplace, as well as getting input from Montreal and elsewhere. It should be significantly higher than the prevailing marketing research interviewer rates, possibly 50% higher.

6.6 Contract Out vs. In-House

Starting with the wage rate established as per the recommendation in Section 6.5 above, the following options should be explored:

i) Conduct the survey totally in-house. By planning well in advance, it may prove feasible to assign a few professional and technical staff to the project from within the agencies to direct and manage the preparations and the implementation of the survey. One of the agencies would have to assume a lead role in terms of being the hiring and payroll agency for temporary staff.

ii) Conduct the survey in-house, but use outside firms to perform specific services. For example, an "office overload" type of firm might be engaged to recruit interviewers who would nominally stay on the payroll of the recruiting company which would bill monthly on a cost plus basis.

iii) Use a contractor/consultant in a similar capacity as in 1986.

It is recommended that all three avenues be explored. A decision will need to be made on the total in-house approach early in the planning (perhaps a year before); if this option is selected then the other two are immediately discarded. If the total in-house option turns out to be impractical, the second and third options can both be retained as options up to the point of selecting a contractor/consultant.

6.7 Geocoding

The geocoding was the one aspect of the Survey which was essentially carried out in-house under the complete direction of the Survey Work Group; it proved to be very successful. The hardware and software performed well and it proved possible to recruit at moderate cost a sufficient number of high quality temporary employees to operate the system.

The system proved itself to be cost effective compared to manual coding to traffic zones, while providing a better quality product in terms of precision and future flexibility. Being a new system, there were obvious areas of improvement identified. Some of these improvements have already been implemented in subsequent work, but there is a need to explore further improvements.

It is recommended that the geocoding system continue to be developed and enhanced with a view to improving its performance while reducing costs. Improvements would include changes to permit use of the system on industry standard microcomputers, and greater emphasis on the following in training interviewers:

i) Use of monuments in describing trip ends.

ii) Use of well defined recording conventions for addresses, monuments and intersections.

6.8 Other Recommendations

The following miscellaneous recommendations are documented for consideration in planning any future survey:

i) In order to enhance the ability to attract interviewers, the survey operations should be established at a central location with good transit access in the evenings (in the Toronto context, being within walking distance of a subway station would be highly desirable);

ii) With direct data entry, paper forms will play a much less important role in future. However, if paper forms are used, they should be designed with the data flow requirements in mind to enhance the ease of use and to minimize the chance of error.

iii) The system must allow the direct electronic transfer of household data (i.e. address) from the sample file to the completed interview record.

iv) If direct data entry is not employed, then data entry should be carried out by professional data entry personnel with 100% verification and a computerized tracking and reporting system should be implemented.

v) Most major telephone travel surveys have been content with making three attempts to contact each household. The Transportation Tomorrow Survey required five attempts; the fourth and fifth attempts were responsible for approximately 12% of the final total of completed interviews. The merits of retaining the fourth and fifth attempts in future surveys will need to be assessed from a detailed analysis of the data produced by these additional attempts. The initial reaction, however, would be to recommend retaining the five attempts, except if it can be shown that these attempts make no significant contribution to the quality of the final data base.

APPENDIX A

PILOT SURVEY

Exhibit A
SUMMARY AND RECOMMENDATIONS

1. General Conclusions

The overall conclusion that is reached about the Pilot Study is that it accomplished the goals originally set out. Research instruments were designed and thoroughly tested, the advance letter was produced, distributed and its effects monitored, the sampling method was tested under field conditions and different methods of data entry were tried. There certainly were difficulties encountered during the project, but it is the nature of a pilot study to create problems in order to discover or invent solutions.

Many of the problems that occurred during the Pilot Study were the direct result of employing untested methods or using new suppliers at the beginning stages of the project. Whenever new suppliers or methods are employed, more than ample time should be allotted to the task in case of problems.

Once the Pilot Study went into the field, the difficulties largely subsided. Environics' interviewers adjusted to the open-ended format of the questionnaire and proceeded to collect high quality data. In fact, the extremely high response rate of the Pilot Study has indicated that the overall design and the instruments were sound.

2. Specific Recommendations

2.1 Use of the Return Trip

Various phases of the Pilot Study were tested with and without the use of the Return Trip. During the first week of the Pilot Study (Days 1 through 6), the Return Trip was used even if both legs of the trip were not connected. For Days 7 through 9, the Return Trip was dropped altogether as respondents were asked to report on individual trips in a consecutive fashion.

When the Return Trip was being used, the average number of trips recorded per household was 6.7 trips. When the Return Trip was eliminated, the average number of trips recorded was 5.7 trips per household. Although dropping the Return Trip intuitively was thought to increase the number of trips recorded (trips were recorded sequentially so there was less of a likelihood of skipping a trip), on average, 1 more trip per household was recorded using the Return Trip design.

The recommendation, therefore, is to continue to use the Return Trip. The concept of returning to a previous origin may have helped respondents to reconstruct their previous day's travel patterns, while the sequential questioning ("Where did you go next?") did not. Whether or not to use the sequential Return Trip (next trip had to be the return) or the out-of-sequence Return Trip (used in the first week of interviewing) cannot be addressed because the two were not empirically tested. Whichever is to be used in the future, it should be kept in mind that interviewers should not be placed in the position of having to make definitional decisions as to what is a Return Trip by having to backtrack through previous portions of an interview while they are interviewing.

3. Evaluation of the Effectiveness of the Trip Log

3.1 Positive Elements

When analyses are undertaken at the individual-level, the trip log appears to indicate an under-reporting of out-of-home trips among households just receiving the advance letter and a telephone call on an unspecified date. When respondents complete the trip log, an additional two trips per household are reported. It is very likely that these extra two trips are a result of the trip log because the household size of the group completing the trip log and the group receiving the trip log but not completing it is identical.

3.2 Negative Elements

Although the information from the trip log is most likely more accurate, it is obtained at high cost. First, the major and most serious drawback of the use of the trip log is the extremely low completion rate (22%). The low completion rate cannot address the question whether households making a greater number of trips simply were more likely to fill out the trip log. (Did the trip log produce more recorded trips or did households who travelled more frequently complete the trip log more often?).

Second, the administrative overhead of inserting a specific date for recording travel and for interviewing is high. As already found, the probability of making mistakes increases with the necessity of specifying dates. Third, the coordination between mailing and interviewing must be very precise. This is, all the calls for a particular night must be made. This scheduling requires the accurate prediction of how many respondents can be reached on a designated evening. There is little room for error. Fourth, there is no saving in the amount of time to retrieve information from respondents. In fact, the extra trips that are recorded require additional time to retrieve.

4. Direct Data Entry

First, Environics did not compile any productivity data about the performance of the four interviewers who directly entered data onto a microcomputer. The recommendations are based on the debriefing questionnaire and comparisons between the paper and electronic data entry methods. Second, it should be kept in mind that four interviewers working for 9 days is a limited test of a new system and its reliability.

Microcomputer data entry during the Pilot Study is best regarded as a test of a prototype system. There are facets of the prototype that worked (the use of the function keys for home and previous origin) and aspects that need more work (editing features). Improvements to the prototype should be made before the final "production model" is released.

The major criticism of direct data entry is the current inability of the system to allow verification of the work of interviewers as it is being completed. Each paper questionnaire and coding sheet is checked by supervisors for completeness and logical consistency as interviews are completed. If supervisors were able to interactively examine and correct the work that has been entered, electronic data entry would be comparable to manual entry. An interactive supervisory system may necessitate the use of microcomputers connected into a local area network (LAN) with a central file server or possibly a move to even more powerful systems.

One final note about electronic data entry. Since street names and addresses are being keyed, interviewers will have to have at least minimal typing skills. This may raise the cost of finding and hiring qualified interviewers.

Should a large number of revisions be made to the data entry system, either in its hardware or software configurations, these changes will have to be field tested. That is, another pilot study will have to be mounted before the main study is to go in the field.

Exhibit B
ADVANCE LETTER

Ontario

Ministry of
Transportation and
Communications

February 27, 1986

Dear Sir/Madame,

To ensure continued improvements to road and transit services in Metropolitan Toronto, Hamilton-Wentworth, Durham, York, Peel and Halton Regions, this Ministry, in cooperation with the Regional governments and transit agencies, is planning to undertake a survey of travel patterns. First, though, we would like to make sure that our proposed survey is easy to understand and will not take much time to complete. We are asking for your help in testing the method which we intend to use in the full survey.

Within the next few days, an interviewer will call and ask to speak to you or another adult resident. They will be phoning on weeknights between 5:30 and 10:00 in the evening or on Saturdays between noon and 6:00 PM, and Sundays between 1:00 and 6:00 PM. Interviewers will ask questions about travel undertaken by the members of your household for the day before. Examples of the questions are: When did you make your trip?, By what means did you get there?, and What was the purpose of your trip (work, shopping, recreation, etc.)?

All information gathered will be kept absolutely confidential; we will only be looking at the total results from an entire community in order to get a picture of the overall travel patterns from area to area.

The interviews are being conducted by Environics Research Group, an independent survey research company. If you have any questions about the survey, please call John Dixon at Environics in Toronto, 964-1397, or contact Public and Safety Information Branch of my Ministry at 248-3501 or 1-800-268-0637 for long distance.

I would like to express my personal thanks for your assistance in this project. By helping us now, we will be able to serve you better in the future.

Yours truly,

David Hobbs,
Deputy Minister

Exhibit C

1986 TRAVEL SURVEY

Number of Persons in Household: ____________

Number of Motor Vehicles: ________________

Travel Date: Wednesday March 4, 1986

Person # or Other Identification	Age	Sex	Driver's Licence	Employment Status Code (Enter letter in box)	
		M F	YES NO		F Work Full Time P Work Part Time S Student H Work at Home 9 Don't Know/Other
		M F	YES NO		
		M F	YES NO		
		M F	YES NO		
		M F	YES NO		
		M F	YES NO		

- KEEP BY THE TELEPHONE DO NOT MAIL THIS FORM -

Person # or Other Identification	Trip #	Origin (exact street address if known)	Destination (exact street address if known)	Purpose (Enter one Number in Box)		Trip Start Time	Method(s) of Travel (and routes for transit)	Transfer Point (if transferring from car to public transit)
Examples Husband	1	Examples Home	Examples 100 Queen Street W, Toronto	1	1 Work 2 School 3 Shopping 4 Personal Business 5 Social Recreation 6 Serve Passenger 7 Return Home	Examples 7.30 [✓ a.m.] p.m.	Examples Car, Subway, 501 Streetcar	Examples Finch Subway
Examples	2	Examples	Examples Yorkdale Shopping Centre	3		Examples 5.15 a.m. [✓ p.m.]	Examples Subway	Examples None
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		
						a.m. p.m.		

Continue over if necessary

Exhibit D

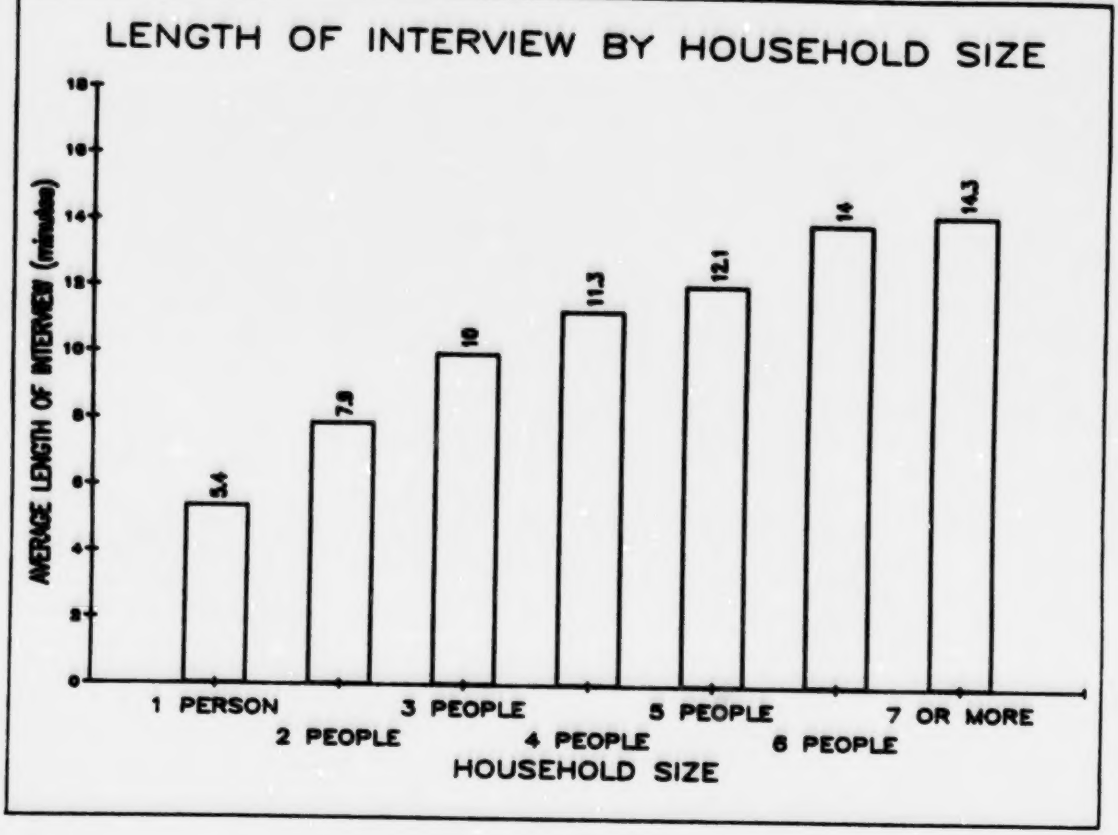

Exhibit E

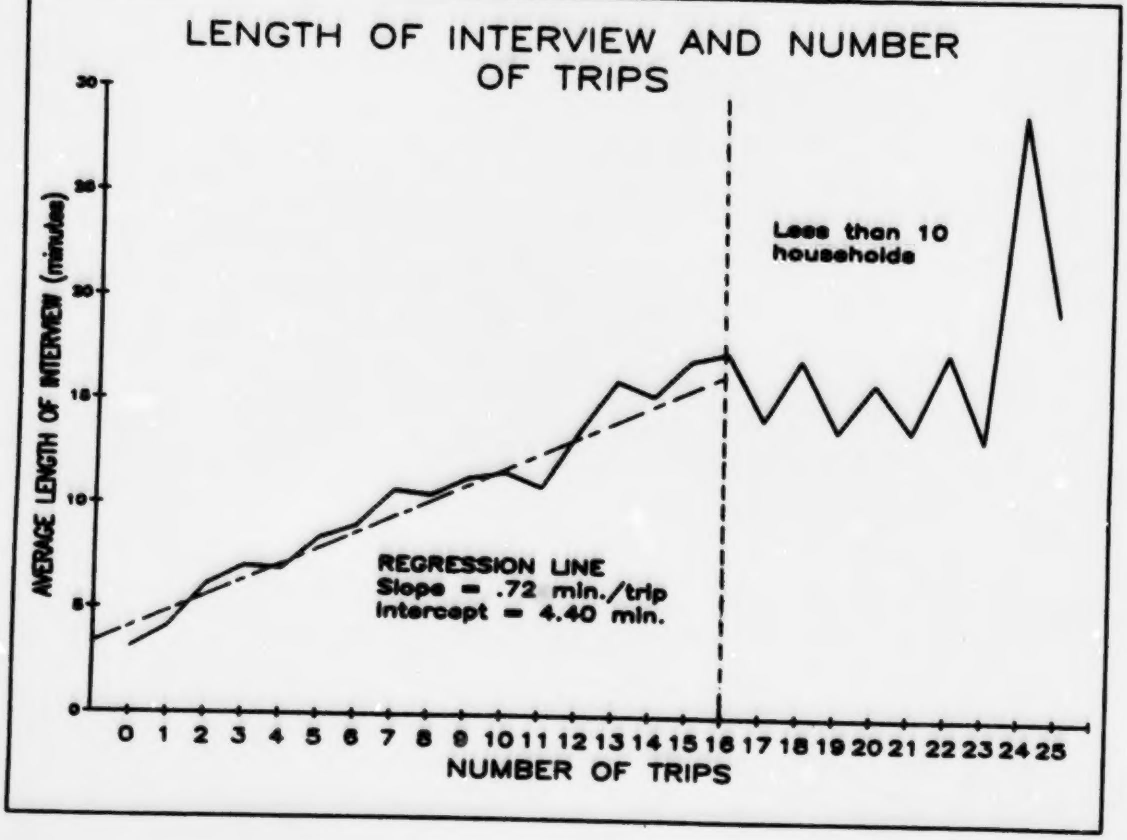

Exhibit F

COMPARISON OF HOUSEHOLDS RECEIVING AND NOT RECEIVING TRIP LOGS

AVERAGE NUMBER OF TRIPS RECORDED

Households completing the trip log (N=61) = 7.7 trips

Households receiving log but **not** completing it (N=214) = 5.7 trips

Households **not** receiving the trip log (N=731) = 6.0 trips

AVERAGE SIZE OF HOUSEHOLD

Households completing the trip log = 2.4 people

Householods receiving log but **not** completing it = 2.4 people

Households **not** receiving the trip log = 3.0 people

AVERAGE TIME OF INTERVIEW

Households completing the trip log = 8.7 minutes

Households receiving log but **not** completing it = 7.3 minutes

Households **not** receiving the trip log = 9.5 minutes

Exhibit G
COMPLETION DATA

	TOTAL
Completed interviews	1012
Language barriers	18
Incomplete interviews	23
Refusals	180
Not eligible	7
Not in service	71
Not available	35
No answer	85
Total numbers in circulation[1]	1431
Total eligible contacts[2]	1233
Refusal rate[3]	15%
Response rate[4]	82%
Completion rate[5]	71%
Completions per interviewer hour[6]	2.3

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[1] Sum of all completed categories

[2] Completed + language + incomplete + refusals

[3] Refusals/total eligible contacts

[4] Completed/total eligible contacts

[5] Completed/total numbers in circulation

[6] Completed/total hours of interviewing

APPENDIX B

TERMS OF REFERENCE

HOUSEHOLD TRAVEL BEHAVIOUR SURVEY
FOR THE GREATER TORONTO AREA
TERMS OF REFERENCE FOR CONTRACTORS

1. INTRODUCTION

1.1 Background

The Ministry of Transportation and Communications, Metropolitan Toronto, the Toronto Transit Commission, and the Regional Municipalities of Durham, York, Peel, Halton and Hamilton/Wentworth have for a number of years coordinated their activities in travel data collection through a committee called the Toronto Area Transportation Planning Data Collection Steering Committee (TATPDCSC). The participating agencies have decided to conduct an extensive survey of travel patterns in the Greater Toronto Area in the Fall of 1986.

To date the TATPDCSC has retained a General Manager to direct the Survey and has conducted a Pilot Survey with almost fifteen hundred households. The Pilot was carried out by the Environics Research Group during March, 1986, to test the design of the questionnaire and the general methodology. A report on the Pilot Survey was prepared by Environics and a copy of this document is available upon request from the General Manager.

At this time the TATPDCSC is prepared to entertain proposals from survey companies individually, or in consortia, for carrying out the interviewing and certain associated tasks as per this Terms of Reference. Proposals should be submitted to the General Manager, 3rd Floor, West Tower, Ministry of Transportation and Communications, Downsview, by 4:00 PM on June 23, 1986.

1.2 Overview of the Scope of the Work

Exhibit A shows the organizational structure of the Survey, and designates approximately the work which is expected to be contracted out.

The project consists of one large Household Telephone Survey (Part A of the detailed specifications) and an optional smaller Trip Diary

Survey (Part B of the detailed specifications). The Contractor's responsibility will be limited generally to carrying out the field work, while the TATPDCSC will retain responsibility for the sample design, the questionnaire design, the logic checks, the validation of the survey results and the subsequent analysis of the data.

Copies of the Household Telephone Survey questionnaire (as originally specified by the TATPDCSC and as interpreted by Environics for the Pilot) are attached as Appendix B. It is expected that the Survey will consist of completed interviews with a minimum of 60,000 households, possibly as many as 75,000 households. The sample (designed by the TATPDCSC) will be obtained by the Contractor from Tele-Direct (a subsidiary of Bell Canada).

In addition to the actual telephone interviewing, the Contractor's responsibilities will include mailing out advance letters, performing certain checks on completed interviews, correcting the interview data, and delivering a complete, "clean" file of the completed interviews on computer tape or disk.

The TATPDCSC also wishes to carry out a parallel Trip Diary Survey as part of the same contract. A decision on this Survey will be based on the availability of funds. A mail-out and mail-back survey is proposed with a questionnaire which is similar to the Household Telephone Survey questionnaire, but more detailed in terms of demographic questions and possibly covering all household travel on more than one day. Telephone contact would be required to remind people to keep a record on the requested day(s), to remind people to mail the diaries back and to follow up on non-response. It is expected that the sample size will be complete interviews with a minimum of 2,500 to 5,000 households.

2. PART A: HOUSEHOLD TELEPHONE SURVEY

2.1 Timing

All interviewing is to be done no earlier than September 15, 1986, and no later than December 5, 1986. The interviewing must cover travel on Mondays through Fridays equally (normal working days only), and no interviewing should be done after 10:00 PM.

2.2 Chief Supervisor

It is a prerequisite that the person proposed by the Contractor for the position of Chief Supervisor be a person with direct relevant experience in supervising a sizable telephone home interview travel survey. The curriculum vitae of the proposed Chief Supervisor should be included in the Proposal.

2.3 Questionnaire

The finalization of the design of the questionnaire, and the structure of the interview will be the responsibility of the TATPDCSC. It is expected that the questionnaire will change only marginally from the Pilot Survey. However, any suggestions from the Contractor will be considered.

2.4 Sample

The TATPDCSC will be responsible for the sample design and will provide the Contractor with the specifications. The Contractor will be responsible for procuring the sample from Tele-Direct or a satisfactory alternative source.

The sample drawn will be based on an expected completion rate of approximately 70%. The Pilot Survey had a completion rate of 71% (82% of eligible households), while a similar survey in Montreal has experienced completion rates of approximately 68% (79% of eligible households).

2.5 Advance Letters

The Contractor will be responsible for arranging the printing and mailing of personalized letters to each household on a daily basis approximately one week in advance of the expected telephone interview.

The specific contents of the letter and any accompanying material will be determined by the TATPDCSC.

2.6 Interviewing Languages

The Contractor will be expected to carry out interviews in other languages in addition to English. The TATPDCSC will provide official translations of the questionnaire in the nine languages listed below; the Contractor is expected to have as a minimum the following number of interviewers able to interview in each of the nine languages:

Language	No. of Interviewers
Italian	8
Portuguese	6
Spanish	5
German	3
Greek	3
Cantonese	3
French	2
Polish	1
Ukrainian	1

The languages and the number of interviewers are subject to change as the Survey proceeds and conditions warrant. The TATPDCSC will provide any new translations which may be required.

2.7 Rates of Pay

The TATPDCSC is concerned about the quality of staff and the turnover in staff (particularly interviewers, but also supervisors and others) who will be employed by the Contractor to carry out the Survey. The rates of pay and any incentive plan will have a bearing on a Contractor's ability to attract and retain good personnel.

It is a requirement that the proposed rates be listed in the proposal. Any incentive plan for minimizing turnover should be described in the proposal.

2.8 Staff Training

The TATPDCSC considers training of the interviewers and their supervisors, and the checkers, correctors and coders to be critical to the success of the survey. TATPDCSC personnel are to be given a minimum of four hours during the training process to instruct the Contractor's staff on the purpose of the Survey, the unique characteristics of conducting an Origin-Destination Travel Survey, and how to deal with a range of possible travel situations. The Contractor would be responsible for other aspects of the training, including instructions on administrative procedures, general instructions on dealing with the public, etc.

TATPDCSC personnel will have the right to reject any of the staff after the training program.

2.9 Supervision/Monitoring

A high level of supervision and monitoring is expected on the Survey. A minimum of one supervisor to six interviewers will be required unless the Contractor can show valid reasons for fewer supervisors.

The proposed supervision and monitoring procedures should be described in the proposal.

2.10 Method of Recording Data

The Ministry of Transportation and Communications has had a consultant study carried out on date entry methods and a Direct Data Entry demonstration project was carried out during the Pilot Survey with the cooperation of the Environics Research Group. The consultant (Professor Gerry Steuart of the University of Toronto) has prepared a report which recommends DDE, and which concludes that the software developed for the demonstration project, subject to some relatively minor refinements, is suitable for the large Survey. Professor Steuart's report and the software used in the demonstration project are avilable on request at no cost.

The TATPDCSC has made no commitment to the results of the consultant study and is willing to consider all proposals with respect to how the interviewers record the data, i.e. whether the traditional pencil and paper or machine readable forms are used, or whether CATI or other computerized direct data entry (DDE) systems are used. The Contractor is encouraged to include more than one alternative in his proposal, if he is capable of carrying out the work using more than one technology.

The decision on the methodology will be made on the basis of cost comparisons, and on the basis of the trade-off between improvements in the quality of data and the risks associated with any new technology. A higher cost may be acceptable if there is a reasonable return in terms of data quality.

2.11 Transfer of Questionnaires to Electronic Medium

All interview data must be on an electronic medium suitable for computerized checking procedures to be carried out during the morning of the following weekday. In the case of traditional paper questionnnaires, it will be necessary to arrange overnight keying in of the data.

2.12 Coding

The questionnaire will be self-coding for all but the origins, destinations and transfer points. The TATPDCSC will retain ultimate responsibility for the method used to code these three items, with the Contractor's role being limited to providing two full time clerks from September 2 to December 19, 1986, inclusive. TATPDCSC personnel will train the coding clerks, oversee their work and assist, if needed, to keep pace with the work.

The TATPDCSC expects to employ a computerized geocoding technique based on StatsCan's Area Master Files. The TATPDCSC will develop and provide the software; the Contractor will run the software at the same time as the automated checking routines (see Section 2.13).

2.13 Checking and Correcting

Automated checking of the completed questionnaires is to be carried out on a daily basis during the morning of the first weekday after the interviewing. The TATPDCSC will provide the software with the logic checks which will be required. The checking must be done on a daily basis to ensure immediate feedback to the supervisors and monitors to rectify incorrect interviewing practices, and to ensure immediate follow-up on incomplete interviews.

The Contractor's staff will run the checking routines, review the results, make any corrections which can be deduced, check with the interviewer if necessary, and send back to the interviewer for a call back if required.

Detailed statistical records (as specified by the TATPDCSC) of the checking are to be provided to the TATPDCSC with daily and weekly summaries. TATPDCSC personnel will review problem areas with the Contractor and agree on corrective action, including removal of any Contractor personnel from their duties.

2.14 Callback Standards

A minimum of five attempts will be made to contact every household. Busy signals are not to be included as one of the five attempts. In the case of no answer, no more than two calls can be made on the same day and, in the case of two calls on the same day, these calls must be at least two and one half hours apart.

2.15 Productivity Estimates

In preparing cost estimates, the Contractor will need to estimate the number of completed interviews that an interviewer can achieve per hour over the course of the Survey period.

The Pilot Survey achieved 2.3 completed interviews per hour per interviewer. A comparable survey in Montreal, which has been conducted several times, routinely achieves six completed interviews per hour per interviewer. A similar survey in Vancouver in 1985 averaged 4.3 completed interviews per hour per interviewer.

The low productivity rate during the Pilot Survey is not considered to be a valid indicator for a number of reasons; emphasis was placed on testing alternative procedures, not on the productivity rates. It is felt that a rate of 4 to 5 completed interviews per hour per interviewer is achieveable in the local setting, with the actual rate being dependent to some extent on the methods employed to record data and to manage the sample, and the organizational and management skills of the Contractor.

2.16 Location of Interviewing

The Contractor should provide cost estimates for the following options:

a) All interviewing conducted from one central location;

b) Interviewing divided between two locations - one in Toronto, the other in the Hamilton area;

c) Any other arrangement preferred by the Contractor; and,

d) Potential cost savings, if any, if TATPDCSC agencies provide the office space at no rent.

2.17 Final Form of Data

The Survey data is to be delivered throughout the Survey period as it is "cleaned", completed and accepted by the TATPDCSC Quality Control personnel. The data is to be on magnetic tape or disk, ready for further computer processing.

2.18 Cost Estimates

The proposal should include your total itemized costs for the various options shown in the summary table on the next page. It is not necessary to include a cost for all methodology options, only those which you are prepared to undertake. However, please provide costs for each number of completed interviews for those methodologies which you are prepared to use. The costs should be itemized by major categories such as interviewers' wages, supervisors' wages, checkers' and correctors' wages, coders' wages, computer costs, mailing costs, telephone costs, and miscellaneous other costs.

It is also necessary to include the information requested in Section 2.14 concerning the impact of alternative locations (i.e. all interviewing conducted from one central location, interviewing divided between a Toronto and a Hamilton location, any other arrangement preferred by the Contractor, and the potential savings, if any, if TATPDCSC agencies provide free office space).

It should also be noted that the proposed wage rates and incentives (if any) for the interviewers and supervisors were requested in Section 2.7.

SUMMARY OF REQUIREMENTS ON COSTS

NUMBER OF COMPLETED INTERVIEWS	METHODOLOGY			
	Pencil and Paper	Machine Readable Forms	Direct Data Entry (DDE[1])	Computer Assisted Telephone Interview (CATI[2])
60,000				
65,000				
70,000				
75,000				

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[1] **This method refers specifically to the Direct Data Entry methodology developed by Professor Steuart as part of his demonstration project.**

[2] **This method refers to any other computer assisted telephone interviewing systems which a Contractor may wish to use.**

3. PART B: TRIP DIARY SURVEY

3.1 Timing

All interviewing is to be done no earlier than September 15, 1986, and no later than December 5, 1986.

3.2 Questionnaire

The finalization of the design of the questionnaire will be the responsibility of the TATPDCSC. However, any suggestions from the Contractor will be considered.

3.3 Sample

The TATPDCSC will be responsible for the sample design. The sample drawn will be based on an expected completion rate of approximately 70%.

The target sample size will be completed interviews with 5,000 stratified households, with 2,500 households being the minimum acceptable number.

3.4 Alternative Methodologies

Since cost may have an overriding effect on the choice of survey design, a minimal cost method has been prepared in addition to the preferred method. These alternative methods are outlined below.

3.4.1 Preferred Method

The preferred method consists of a seven day trip diary kept by each member of a random sample of households which have not previously been called from amongst the main Household Telephone Survey sample. The following procedure would have to be followed:

1) **Telephone call to give basic information about the survey, ask basic questions to determine if household needed for stratified sample, seek cooperation in keeping a trip diary for a week, and to find out how many diaries are required.**

2) **Mail out an official letter and the appropriate number of diaries**

approximately one week in advance.

3) **Telephone call night before to remind household members to begin keeping diaries following morning.**

4) **Telephone call on evening of third day to give encouragement and answer questions.**

5) **Another telephone call on evening of sixth day.**

6) **Telephone call on day after end of week to remind people to mail in the dairies.**

7) **If diaries not received by fifth day after end of week call again to remind people.**

3.4.2 Minimal Cost Method

The minimal cost method consists of a one day trip diary kept by all members of households selected from amongst those previously interviewed by telephone. The following procedure would be employed.

1) If telephone survey indicates a type of household which is needed for stratified sample, mail out the appropriate number of diaries together with an official letter thanking them for cooperation in telephone survey and soliciting further assistance in this special follow-up survey.

2) Telephone call the night before the designated trip diary day to remind people to begin recording trips.

3) Telephone call the day after the designated day to remind people to mail it in.

4) If diaries not received by fifth day after "diary day", call again to remind people.

3.5 Advance Letters

The Contractor will be responsible for arranging the printing and mailing or personalized letters and the correct number of trip diary forms to each selected household on a daily basis approximately one week in advance of the survey.

The specific contents of the letter and any other accompanying material will be determined by the TATPDCSC.

3.6 Interviewing Languages

The Contractor will be expected to complete interviews in other languages in addition to English. The TATPDCSC will provide official translations of the questionnaire in the nine languages listed below; the Contractor is expected to be able to make telephone calls in these languages.

Italian	German	French
Portuguese	Greek	Polish
Spanish	Cantonese	Ukrainian

The languages are subject to change as the Survey proceeds and conditions warrant. The TATPDCSC will provide any new translations which may be required.

3.7 Rates of Pay

The TATPDCSC is concerned about the quality of staff and the turnover in staff (particularly telephone staff) who will be employed by the Contractor to carry out the Survey. The rates of pay and any incentive plan will have a bearing on a Contractor's ability to attract and retain good personnel.

It is a requirement that the proposed rates be listed in the proposal. Any incentive plan for minimizing turnover should be described in the proposal.

3.8 Staff Training

TATPDCSC personnel are to be given a minimum of four hours during the training process to instruct the Survey staff on the purpose of the Survey, the unique characteristics of conducting an Origin-Destination Travel Survey, and how to deal with a range of possible travel situations. The Contractor would be responsible for other aspects of the training, including instructions on administrative procedures, general instructions on dealing with the public, etc.

TATPDCSC personnel will have the right to reject any of the staff after the training program.

3.9 Transfer of Questionnaire to Electronic Medium

All interview data must be transferred onto an electronic medium suitable for computerized checking and processing. It will be nécessary to arrange for the questionnaires to be keyed in as they are returned.

3.10 Checking, Correcting, and Coding

The questionnaire will be designed to be as self-coding as possible, but as a self-administered instrument, each returned form will need to be checked, corrected and coded. Some cases will require telephone calls to clarify the data.

With respect to coding origins, destinations, and transfer points, the Contractor will be responsible for ensuring that valid, legible addresses are recorded in the diary. The TATPDCSC will be responsible for the coding of this information.

The TATPDCSC expects to employ a computerized geocoding technique based on StatsCan's Area Master Files. The TATPDCSC will develop and provide the software; the Contractor will run the software at the same time as the automated checking routines.

The TATPDCSC will provide the software with the logic checks to be applied to the completed questionnaires. The Contractor's staff will run the checking routines, review the results, make any corrections which can be deduced, and make any call backs that may be necessary.

Summaries of the results of the checking are to be provided to the TATPDCSC on a weekly basis. TATPDCSC personnel will review problem areas with the Contractor and agree on whatever corrective action may be necessary.

3.11 Callback Standards

A minimum of three attempts will be made to contact every household at each stage. Busy signals are not to be included as one of the three attempts. In the case of no answer, the calls must be at least one hour apart.

3.12 Survey Location

The Contractor may conduct the Trip Diary Survey from one, or more locations, whichever is the most cost effective. The cost estimates should include potential cost savings, if any, if TATPDCSC agencies provide the office space at no rent.

3.13 Final Form of Data

The survey data is to be delivered throughout the Survey period as it is "cleaned", completed and accepted by the TATPDCSC Quality Control personnnel. The data is to be on magnetic tape or disk, ready for further computer processing.

3.14 Cost Estimates

The proposal should include your total itemized costs for completed interviews with 2,500 and 5,000 households by the preferred method and by the minimal cost method. The costs should be itemized by major categories such as wages, computer costs, mailing costs, telephone costs, and miscellaneous other costs.

The proposed wage rates and incentives (if any) should be shown separately, together with the potential cost savings if TATPDCSC agencies provide free office space.